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# THE *Finish* Line

**TOO LITTLE, TOO LATE** — may have an appropriate application for those who are waiting for "things to break" before beginning an aggressive job of education and promotion for their products. There has always been some tendency in the enameling industry to depend on the inherent qualities of our industry's product to do the selling job. The "better mouse trap" idea may work some times, but let's not forget that other people improve their "mouse traps" also.

Predictions are for big business in every line that affects our industry — but — certainly no thinking businessman would predict freedom from competition in these fields.

#### The "light" and "bright" metals

The producers of these metals are telling their story of the finer things to come and are paving the way for bigger and better business. See the report in this issue of *finish* on "Unfinished Rainbows" (*A.C.S. St. Louis meeting*, page 29) as a typical example.

To the manufacturer, to merchandising channels and to the consumer goes the story of better and more useful products to be made from the "light" and the "stainless" metals.

#### From refrigerator doors to solar radiation

Glass producers are in the forefront when it comes to the effective presentation of their products. Pick up any magazine for women or the home, or any architectural trade publication, and you will see glass presented attractively, both editorially and in advertising space.

Glass may be shown for home appliances or furniture, for store fronts or interior displays, for the lowly fruit jar or the most modern application of plate glass or glass brick in the home of the future. In any case, you can rest assured the product will be attractively and effectively portrayed.

#### A world made of plastics

It is probable that no more false information in the way of fanciful dream pictures has ever been presented about any material or product by writers for publications of every type than has rolled from pen and typewriter on the subject of the "plastic age."

JUNE • 1945 *finish*

There has been lots of bunk, of course — but — also much to consider seriously. Plastics (without attempting to set a line of demarcation as to what should be included in the term) *do* offer great possibilities for a myriad of uses. What's more, their fine points are being heralded from every possible source. They have "caught on."

These are only three classes of materials which are competitive in some of the fields on which porcelain enamel is dependent for expanded usage. It is true, of course, that all these materials can be combined with porcelain enameled metal in many applications, with resultant credit and advantage to both.

#### What about it?

Porcelain enamel needs, and always has needed, far stronger backing in educational and promotional activity. Without belittling the efforts of cooperative organizations, individual steel and frit producers, and the few manufacturers of finished products who are doing an excellent job, we say that before porcelain enamel has a chance to compete in promotion with any of the materials mentioned, scores of others must add the weight of their time and money to this effort.

#### The power of the press

When you see innumerable articles in magazines and newspapers on competing products, don't forget that as a rule data for these articles come from some source associated, or in close contact, with the product. At present the porcelain enameling industry makes no provision for furnishing editors constructive data of a technical, practical or educational nature designed for editorial use.

Most editors are busy men, and if our industry does not feel that it has a story to tell, then it is improbable that the average editor will feel obligated to "dig" for stories on porcelain enamel.

This is a subject deserving of thought and "action."

*Dana Chase*  
Editor and Publisher



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## **Extra Sales Appeal For Porcelain Enameled Products**

New markets can be opened and sales in old markets can be expanded with Inland Ti-Namel—the new alloy steel porcelain enameling base which has many special appeals to buyers and consumers.

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In addition to greater market possibilities, Inland Ti-Namel offers important advantages in the shop—forming qualities equal to the best deep drawing steel, elimination of ground coat, lower and shorter firing temperatures, greater output per square foot of floor space, etc.

Inland has issued a new Ti-Namel Bulletin.  
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# **INLAND TI-NAMEL**

# Flash welding in metal fabrication

recent developments in flash welding should be studied by enamelters

By H. J. Malee • WESTERN STOVE COMPANY, AND  
Gilbert C. Close • LOS ANGELES CORRESPONDENT FOR FINISH



At first glance the connection between flash welding and enameling may seem rather hazy. However, a brief analysis of flash welding characteristics indicates immediately that the process offers many advantages in fabricating the type of products commonly enameled, while at the same time it eliminates the difficulty inherent with applying enamel frits over a flame welded area. The advantages in conjunction with fabrication are not confined to welding only, but include the peculiar adaptability of the flash welder for use in production of light upset forgings.

Post-war consumer demand and consumer purchasing power will be at an all-time high. This should not lull manufacturers into the attitude that inferior products will find a ready market. Memories of the recent depression, still sharp-etched in many minds, and the subconscious fear that another depression may occur in the wake of the present conflict will instill in the average buyer a discriminating canniness regarding the quality of the products on which he spends his money. Flash welding is one of the many war-improved processes at the disposal of the enameling industry for improving product quality to meet customer demand.

## Perfected flash welding a recent development

Development of flash welding to its present state of perfection has occurred within the past two or three years. Prior to the war, the process was used quite extensively in the automotive industry, but little effort

was expended either to improve flash weld quality, or to adapt flash welders to a wide variety of uses. Credit for the current efficiency of the process is due largely to aircraft engineers who, when the demand for airplanes rocketed to mass production proportions, adopted the process and improved it to meet exacting aircraft requirements.

Flash welding is a process wherein the heat generated by the passage of a heavy electrical current through the parts to be welded is utilized to join the parts by fusion. In upset forging work, the heat-time cycle of the flash welder is adjusted to reduce the metal to be forged to a plastic state. Either welding or upset forging with the flash welder becomes a semi-automatic process once the machine has been adjusted for the type of work involved.

## A disadvantage

The advantages and disadvantages of flash welding, when compared to other welding processes, are definite. The principal apparent disadvantage is that flash welding is primarily a butt welding procedure, wherein the parts to be joined must have equal cross-sectional area, and must conform to modified circumferential contours. However, a bit of study in conjunction with this disadvantage indicates that it can be eliminated in many instances by proper design of the parts to be welded. Diagrams A, B, and C illustrate how parts may be readily modified to meet the requirements of flash weld fabrication.

## Eight advantages

Advantages of flash welding accrue both from the inherent characteristics of the process and its economic effi-

ciency. Briefly enumerated, these advantages are: (1) Weld strength equal to that of the part itself (flame and arc welds are limited to an 80 per cent strength factor in engineering design); (2) uniformity and consistency; (3) weight economy; (4) cost economy; (5) maintenance of close tolerances and minimizing of warpage; (6) reduced heat scaling caused by welding, and elimination of post-weld heat treatment when the parts will be used in the normalized condition; (7) parts may be finish machined prior to welding; and (8) less operational skill is required due to the semi-automatic operation of the flash welder. In conjunction with the above, the fact that the machines may be used for upset forging offers a distinct advantage to concerns without sufficient welding volume to keep a flash welder consistently employed.

## Principles of flash welding

Before discussing in detail the above advantages, a brief description of the principles involved in flash welding will aid those not entirely familiar with the process. Fundamentally, a flash weld machine consists of one stationary and one movable platen mounted on a way and accurately aligned with each other. A mechanical or hydraulic cam action unit is included to actuate the movable platen toward its stationary mate. Clamping dies for holding the parts to be welded are provided for each platen.

The platens are insulated from each other in an electrical sense. The welding current is fed into the clamping dies, and the circuit is completed when the movable platen brings the one weld component into contact with the other.

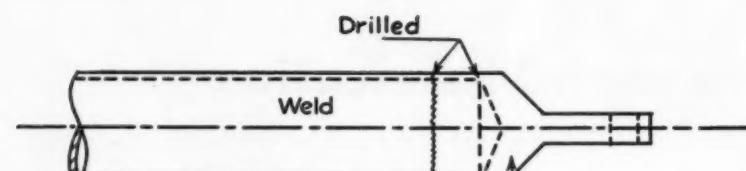


DIAGRAM 'A'

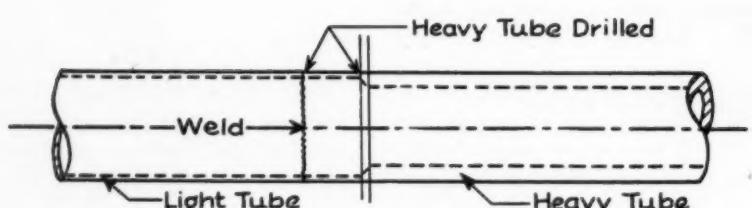


DIAGRAM 'B'

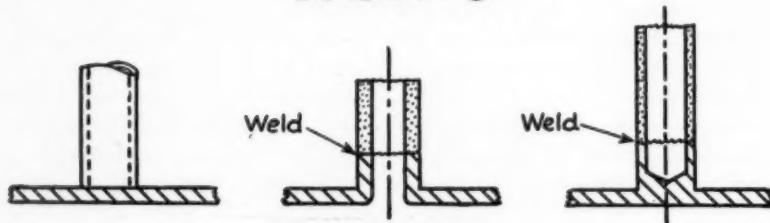


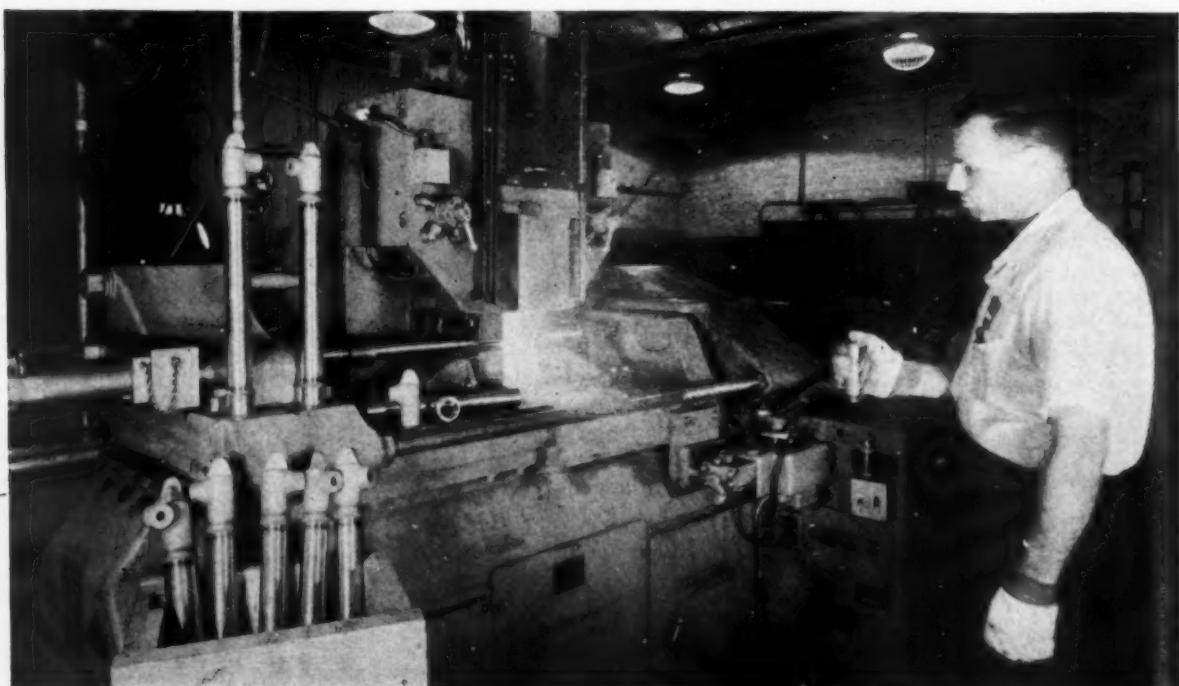
DIAGRAM 'C'

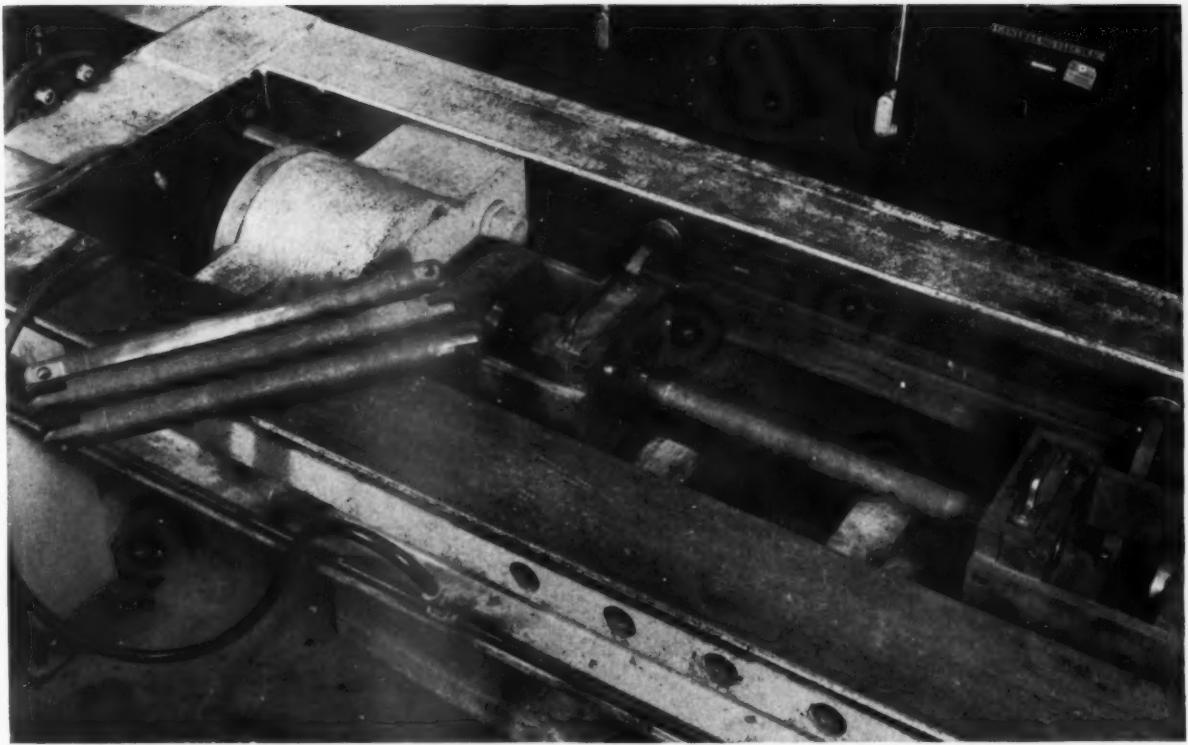
*Flash welded assemblies must have equal cross-sectional area through the weld. These diagrams suggest methods of machining or drilling parts to give equal areas through the weld. Note in Diagram "C" that the tube can not be flash welded to a flat plate, but plate design may be modified as shown so that tubing can be flash welded to it.*

The flash weld is accomplished in two distinct phases; the flashing phase and the upsetting phase. Theoretically, the opposing ends of the parts to be butt welded will never lay in exactly horizontal planes. Thus, when the parts are brought together there will be an initial point of contact which will be fused by the surge of low-voltage high-amperage alternating current. When this initial contact area has been burned away, other areas of the weld joint will be brought into contact and the arcing continues. The metal vapors trapped by the molten metal in the arcing area cause the arc to explode, sending out a shower of sparks from which phenomenon the process obtains its name. This flashing has a distinctly advantageous aspect in that the molten metal being projected from the weld area cleanses it of slag and other impurities, while at the same time the adjacent metal is preheated to the plastic state required for upsetting.

A thin film of molten metal forms over the areas to be welded during this flashing cycle. When the pre-calculated amount of flashing burn-off has occurred — or, more specifically, when flashing has continued long enough to bring the adjacent metal

*A large 450 kva flash welder in operation.*





*A flash welded part in a tensile proof loading machine. Due to adherent flash metal, neither magnetic inspection nor X-ray can be used for determining the quality of a flash-weld. Proof loading of random parts is a dependable quality check.*

to a plastic state—the current is switched off, the pressure on the movable platen is increased, and the two weld components are forged together. This forging action causes the molten metal and a certain portion of the plastic metal to be exuded beyond the periphery of the intended weld area. This final exudation of metal tends further to cleanse the weld joint of undesirable impurities.

#### **Chemical composition of metal unchanged**

The net result of the above action is a weld joint incorporating strength equal to that of adjacent portions of the part. Furthermore, as no metal has been added during the welding process, the chemical composition of the metal through the weld joint is exactly the same as it was prior to welding. This point alone is extremely important in certain post-weld manufacturing operations where the metallurgical composition of the metal will affect processing operations. It seems logical to assume that this homogeneity of base metal would

aid in minimizing the blistering and poor adherence of enamel frits applied over flame welded areas.

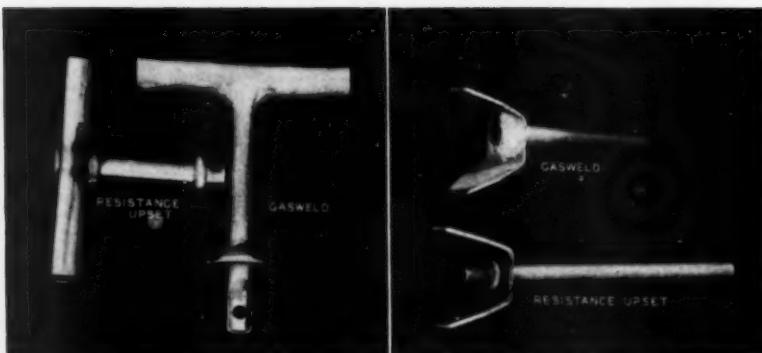
The success of the flash welding process is largely dependent on accurate precalculation of current intensi-



*An upset forging produced on a flash welder sectioned and etched with a 10% nitric acid solution! Note the consistency of the metal grain through the upset portion.*

ties, the amount of platen travel and time interval used for flashing, and the pressures required for forging the parts together during the final phase of welding. These factors will vary with parts of different size and alloys of different composition. Tables and charts are available from the manufacturers of flash welding equipment giving recommended settings for the more common operations and materials. However, when a large number of similar parts are to be welded, a good method is to weld several experimental parts and test them to destruction, altering the machine settings as required to obtain the maximum weld strength. When proper settings have been determined, parts tested in tension will consistently break outside of the weld.

The metal exuded by the forging phase of flash welding is commonly termed "flash." When close tolerances are not involved, the usual practice is to grind flash to within  $1/64$  inch of the part surface. Metal exuded inwardly in flash welded tubing is generally left intact unless the



*Left: The same part fabricated by gasweld and riveted by upsetting on a flash welder. The latter process saves weight, is more dependable, and can be accomplished by less experienced personnel than the gas welded part. Right: Another comparison between gasweld and resistance upsetting.*

inner portion of the tube requires a machined surface such as when it is intended as a cylinder bore, fluid line, etc.

#### A 100% strength factor

Returning to the specific advantages of flash welding, it is readily evident that weld strength and weight economy are closely related. In the fabrication of highly stressed parts, the 100 per cent strength factor allotted to the flash welded joint by engineers eliminates the necessity for oversized parts. This acts to reduce product weight and conserve raw materials. At the same time, the uniform consistency of flash welds holds rejects at a minimum with a consequent economic advantage.

Flash welders currently available are rigidly constructed machines, capable of holding very narrow tolerance limits in the alignment and concentricity of welded parts. Maintenance of close tolerances is further aided by the localized heating during flash welding. The process is completed so rapidly that the more remote sections of the part have no time to be heated by conduction. This keeps warpage at a minimum. For the same reason scaling and heat oxidation is held to a minimum.

When flash welded parts will be used in the normalized condition (and this includes all parts except highly stressed members), there is no need for heat treatment subsequent to welding. Due to uniform heating and cooling throughout the weld area, very few localized stresses are trapped

to endanger subsequent life of the metal. For this reason also, weld components may be finish-machined prior to welding. This is highly advantageous with certain complicated shapes where machines set-up after welding may be extremely difficult.

The simplicity of the flash welding process is another feature highly advantageous in the face of experienced personnel shortages. Though the foreman or superintendent of a flash welding department would need to be thoroughly conversant with the process to establish machine settings and determine weld quality, actual operation of a flash welder is relatively simple, and facility with the machines can be acquired in a short time. This is a far cry from fusion welding, where every workman must

have years of experience and can demand top-bracket wages.

#### Producing upset forgings

Use of the flash welder to produce small upset forgings is rapidly gaining prominence. Here again a bit of forethought and study of the illustrations with this article will indicate immediately the many possibilities of this procedure in the manufacture of such items as stoves, refrigerators, washers, etc.

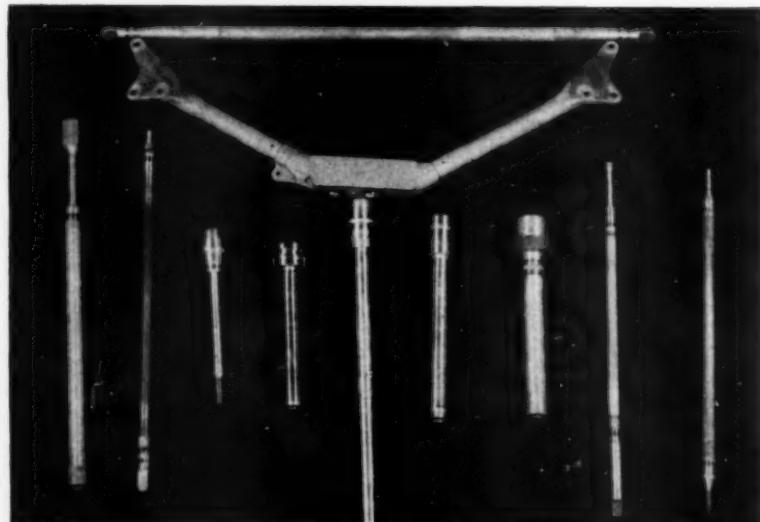
The basic principles of upset forging are similar to those of flash welding. In upset forging, however, a solid bar or tube is clamped between the platen dies. The current is turned on and allowed to flow until the metal is heated to a plastic state. The current is then interrupted and the movable platen actuated toward its stationary mate. This causes the plastic metal between the dies to expand in all directions into a uniform bulge.

Now let us examine the metallurgical characteristics and possible uses for this bulge. When the metal is exuded during forming of the bulge, none of the metal flow lines are interrupted. This results in the maintenance of the best possible metallurgical characteristics, with high strength, resistance to wear, and machinability preserved to a high degree.

The uses for a bulge of this type are limited only by the imagination. Sub-

*to Page 50 →*

*Typical flash welded parts.*



# Essential war work

## keeps this enameling plant busy

By R. E. Braggins • ENGINEER, THE ERIE ENAMELING COMPANY, ERIE, PENNSYLVANIA



When the war started, one of the principal outlets for our porcelain enameling production was in architectural work. This outlet, of course, immediately disappeared. We did have a number of other important items which served a very definite purpose in the conservation of critical materials and, in some instances, conservation of labor. While they did not represent large square footage, they formed an essential background of work to keep our enameling plant in operation.

We immediately made a complete study of the products that we were enameling, or which we felt could be enameled, to determine which would fall in the classification of essential war products. Some of these were actually required as war product components — others were allied equipment for domestic use which reflected either material or labor saving.

### Standard production items classed as essential

After we completed this study it was surprising the number of products or parts of products that showed up as excellent possibilities for porcelain enamel to play a part in the war picture. A number of these products were standard production items before the war, but were classed as extremely essential to war activity. An example of this is X-Ray and photographic development equipment. Due to war requirements production on items such as this increased many fold.

Another item of this nature was represented in porcelain enameled range boilers which we were produc-

ing before the war. These had been sold in modest quantities, but after the Federal Housing Authority approved their installation for government housing our entire range boiler capacity was immediately needed.

### Replacing critical metals

Other products came into the picture as replacements for extremely critical materials that were not available. In this classification would fall such an item as porcelain enameled steel piping to replace the corrosion resistant metals so highly critical early in the war.

There were other products, such as steam cookers for army field units, which, while of standard design, would not normally be in production during peacetime. Requirements on such items as these immediately jumped to large quantities. After a careful study of the possibilities we found there were sufficient of these production items to justify continuation of our enameling operations.

### Prime contracts for fabricated parts

While most of the work mentioned gave us enamel plant production, it offered little work for our fabricating department. We learned that an attempt was being made to convert powder containers from the then critical aluminum to steel. We cooperated with the Navy Department in the design of a powder can, combining cold rolled steel with a minimum quantity of brass, to make a satisfactory replacement unit for this essential item. The result was a prime contract for the production of these powder containers in large quantities. This kept our fabricating department at capacity.

One of our conveyorized porcelain enamel driers was found useful in the

production of this item as an oven for baking the organic finish. The drier was of the ventilated, indirect fired type, so that it could be used successfully without hazard.

The experience on the powder container contract led us to our next prime contract, this time with the army, for a very critical shell container. We have since produced many thousands.

### Interesting enamel applications

To get back to the applications for porcelain enamel which have played a rather important part on specialized items, a few will be discussed which might be of interest to enamelters, either due to the nature of the production or to the peculiarity of the enamels or enameling process required.

### X-Ray and photographic developing equipment

The principal requisites for X-Ray and photographic developing tanks are resistance to the acids used in the process, and ease of cleaning. It is very important in the production of these tanks that only the best of acid resisting enamels are used. If this is done, the resulting equipment represents, in our minds, the best possible answer to the requirements.

Aside from the practical advantages, porcelain enameled equipment of this kind adds to the neatness and appearance of any studio or developing room to a degree impossible with bare metals.

### Industrial piping

The synthetic rubber industry faced serious equipment problems when the corrosion resistant metals became so critical. We found it possible to answer some of their most difficult ones through the use of acid



*" . . . one of the principal outlets for our porcelain enameling production was in architectural work."*  
Photo shows a typical Erie pre-war job.

resisting porcelain enamel as a coating for standard steel pipe and fittings.

In most instances the porcelain enamel is applied only to the interior of the pipe, although other requirements called for the protection of the exterior.

Aside from the requirements for corrosion resistance, there is also the problem in the synthetic rubber industry of "shut down" time required for cleaning the equipment. It was found that on porcelain enameled parts the time required for cleaning was greatly reduced, resulting in a manpower saving.

An interesting application in this field was in curved lines of 4" diameter pipe used as agitating lines for the latex tanks. In this case steam was passed through the pipes as an agitating medium and distributed through the tanks by means of perforations in the pipe. An acid resisting

ground coat is used on these parts, and they are fired on pins in a standard box type furnace.

Another application that falls in this same class of work is the protection of the interior of valve bodies. Here again, acid resistance or abrasion resistance is usually the important factor.

#### Enameling on copper

An interesting job from an enameler's standpoint is that of the application of porcelain enamel for electric insulating properties on reactance transformer coils for special uses. These coils are usually made from  $\frac{1}{4} \times 3"$  bar copper, wound on edge to a total weight of 100 lbs. or more. Great care must be exercised throughout the entire operation of enameling as these coils must be completely covered and must keep their original shape within very close tolerances. They form an important part of very

expensive equipment and must stand up under high voltages without failure. Special enamels and special techniques have been developed for meeting all these requirements.

#### Coal chutes

A typical carry-over from peacetime operations are coal chutes used for the delivery of coal from both storage bins to delivery trucks and from trucks to consumers' bins. Porcelain enameled coal chutes have been used for many years. On the basis of proved savings in material and manpower, we were permitted to manufacture our line of porcelain enameled chutes on prewar schedules.

An enameled coal chute can be used for a great number of years. Enamel wears considerably longer than unfinished steel, and when worn the chute can be re-enamed, thus saving steel.

There is also ample proof of labor

saving. Coal or any hard fuel can be delivered in a fraction of the time required with unfinished chutes, and it was found that the ready flow of material down the chute eliminates the necessity for a two-man crew on coal delivery trucks. This means a saving in the labor required for coal delivery.

#### Railroad signals

Regardless of wartime conditions, railroads must protect their right-of-ways with proper signals and warning signs. Here again porcelain enamel retained its place in the picture as the only logical protection for those important warning signals. It gives the lasting quality needed under highly corrosive conditions—in all weather—and retains the brightness important to signals of this type from a safety angle.

#### Water purifiers

This is a specialized item used in

water purifying units on which the porcelain enamel offers the corrosion protection required under widely varying water conditions.

The completed units are used by the armed forces and for other war purposes in the purification of drinking water. These are comparable in principle to municipal water purification equipment, except that they are designed on a much smaller scale.

#### Miscellaneous items

Other miscellaneous jobs included in our wartime production activity are the fabrication of radar tube shields, fabrication of steel machine bases replacing cast iron, etc. Some other miscellaneous jobs involving "enameling only" include the finishing of cast iron medical sterilizers, cast iron pump parts and steel stove parts. Another item we enameled in large quantities, but did not fabricate, was a steam cooker for army field

units. In addition to this, one of our furnaces has been almost continually busy normalizing semi-steel valve bodies of large sizes.

#### Airplane exhaust manifolds

Not least in the wide variety of enameled products is the airplane exhaust manifold. We felt from the first consideration of this item that it was a logical use for porcelain enamel once the details of design, proper enamels and details of application were worked out.

Impetus to this development came when the Bureau of Standards made a complete study of the requirements and designed ceramic coatings to meet this emergency requirement. The coatings developed offer the required resistance to heat and corrosion and, at the same time, offer maximum resistance to mechanical damage due to the extremely thin films which are applied. Once the authorities were

*"One of our conveyorized porcelain enamel driers was found useful . . . as an oven for baking the organic finish." —Successful conversion for a prime war contract.*





Industrial valve bodies.



Cast iron and steel hot plates.



Bubble caps and developing tanks.

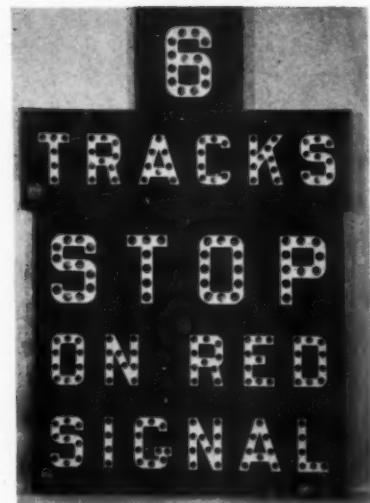
convinced of the value of this coating a great amount of cooperation was necessary to get the final designs which would satisfy all requirements. Now this is rapidly becoming an important item in our production, and the trend to ceramic coating for this and similar uses will steadily increase.

We believe the enameling industry can feel justifiably proud that it has been able to meet an important need for aircraft parts in connection with these manifolds. This represents only a start in the possible uses for high

heat and corrosion resisting ceramic finishes for aircraft and marine applications.

#### A glimpse at the future

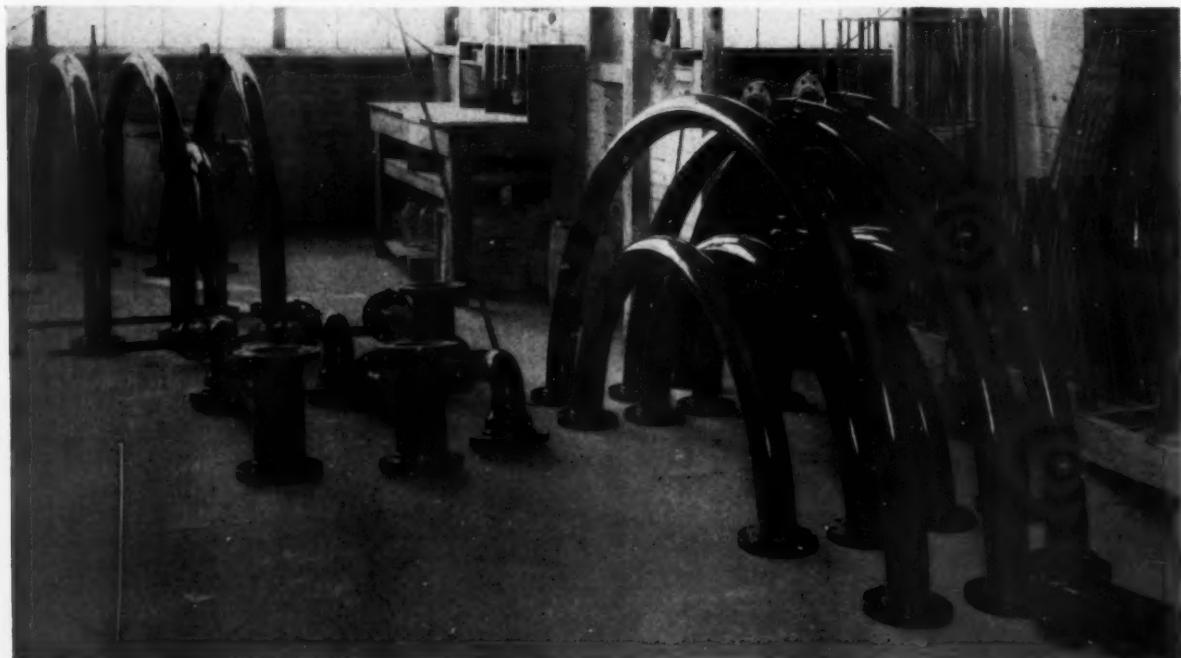
At the beginning of the war the possibilities for the use of porcelain enamel in connection with war production did not look very bright. But, as can be seen, we found that it was possible, through diversification, to keep an enameling plant in profitable operation on items that fit in with the general war picture.



Railroad warning signs.

As for the future, we feel it holds great possibilities for porcelain enameling, and we are making extensive plans for complete modernization of our plant equipment, including the installation of new pickling equipment, automatic spraying equipment of the latest type, a continuous furnace and other essential items. We intend to completely modernize our plant for what we expect to be the biggest demand in history for porcelain enameled metal.

*"The synthetic rubber industry faced serious equipment problems . . ."*



# Electrostatic spraying of porcelain enamels

a detailed report on an investigation of a new method of enamel application

By James B. Willis • RESEARCH LABORATORIES, PEMCO CORPORATION, BALTIMORE, MD.

## PART I

### I. Introduction

One of the more serious problems which has confronted the enameeler for many years has been the problem of overspray. Experience has shown that even in the best run plants as much as 50% and sometimes even greater amounts of enamel which is put through a spray gun never reach the surface of the ware. While it is true that a large portion of this material remains in the spray booth and can be reclaimed, it represents a considerable economic loss since not only material but the time and labor required to prepare the milled enamel are involved. Furthermore it is usually undesirable to use the reclaim for finish-coat application. The matter of salvage is often difficult since it is hard to prevent contamination, especially when the material remains in an open spray booth. Much time and money have been spent in the development of spraying equipment and training personnel in the spraying technique. Special types of booths to minimize the contamination and facilitate the reclaiming of the overspray have been constructed. The best water-washed spray booth on the market, however, will not prevent the contamination of reclaimed material with banana peels, apple cores, an occasional plug of tobacco and other miscellaneous items which have a strange habit of finding their way into the reclaim enamel.

#### (\*) Process used for paints and lacquers.

A number of years ago, the Harper J. Ransburg Company of Indianapolis was faced with a similar problem relating to the application of paints and lacquers. Organics cannot be salvaged as are enamels, and any ma-

terial which does not find its way to the surface of the ware may be counted as lost as well as difficult to remove from the spray booths and equipment. Because of these problems, the Ransburg Company conceived the idea of applying the principles of electronics to the problem and achieved a major success.



James B. Willis — prepared this paper for the 47th Annual Meeting of the American Ceramic Society. It is reprinted in full from the "Journal" by special permission of the American Ceramic Society.

Considerable publicity has been given the electrostatic spraying process, especially during the war years when it has made possible the production of superior articles from the standpoint of uniformity of coating together with the elimination of the loss of coating materials, many of which were critical.

There has been little consideration given to electrostatic spraying of porcelain enamel. Some experiments were carried on in one of the enamel

(\*) Headings supplied by finish.

plants, but no decision was made as to whether the process was applicable to the porcelain enamel industry. Equipment more recently was procured, and an investigation was begun to determine whether or not the electrostatic spraying process could be applied to porcelain enameling.

### II. Equipment

The process consists of the charging of the spray particles in an electric field and the attraction of these particles to the object to be coated, a process not dissimilar, theoretically, from electroplating except that in the latter case the metallic particles are suspended in a water medium, whereas with the former, the spray particles are suspended in air. The object to be sprayed is grounded and is surrounded by an electrical field of such a nature as to impart a negative charge to the atomized particles entering the field. The particles so charged migrate toward the object which bears a positive charge. Such a field is provided by a specially designed rectifier and transformer which produces a very high voltage (Fig. 1). Power is supplied to the power pack in the form of a 220-volt, single-phase, 60-cycle current. The secondary voltage reaches a maximum of 100,000 volts, single-phase, half-wave, 60 cycles, with a current rating not exceeding 10 milliamperes.

The electrical field is produced by an electrode system composed of a series of fine copper wires, suspended parallel to the surface to be sprayed (Fig. 2); if the pieces are being sprayed in a horizontal position, the electrode system will be suspended horizontally. It is essential that the electrode system conform in contour to the object being sprayed. Excep-

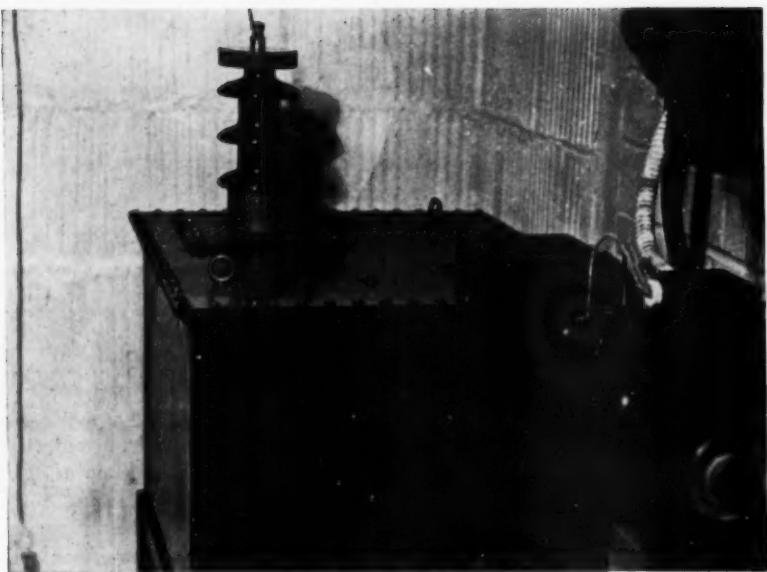


Fig. 1 — Power pack.

tion may be taken to this rule in the case of cylindrical or similarly shaped objects which can be rotated while passing through the field.

The electrode wires are spaced in relation to one another and to the grounded object so as to produce the proper intensity and direction of impulse in the field established. Generally speaking, a spacing from 6 to 8 in. between electrode wires and 10 to 12 in. between electrode and the piece has been found most efficient. Since the force of the field is proportional to the distance between

electrode and ground, an increase in the distance rapidly decreases the force of the field, but the distance must be adequate to obviate the possibility of a static spark between electrode and ground, nullifying the effect of the field entirely.

The force of the field is also proportional to the difference in surface area of the electrode wires as compared with the area of the object being sprayed. The aggregate area of these wires must be very small in comparison with the area of the article opposite the electrode. If this prin-

ciple is carried to the extreme, however, a noticeable decline in efficiency is noted. A No. 30 copper wire has been found most effective for this purpose and is recommended for all installations.

(\*) **Suitable for continuous conveyer system.**

For efficiency of operation, the ware is usually suspended on a conveyer line which is grounded to provide a negative pole for the system. The conveyer used in the present investigation is equipped with a variable-speed motor and a variable-speed transmission providing any desired cable speed from 2½ ft. per minute to 35 ft. per minute.

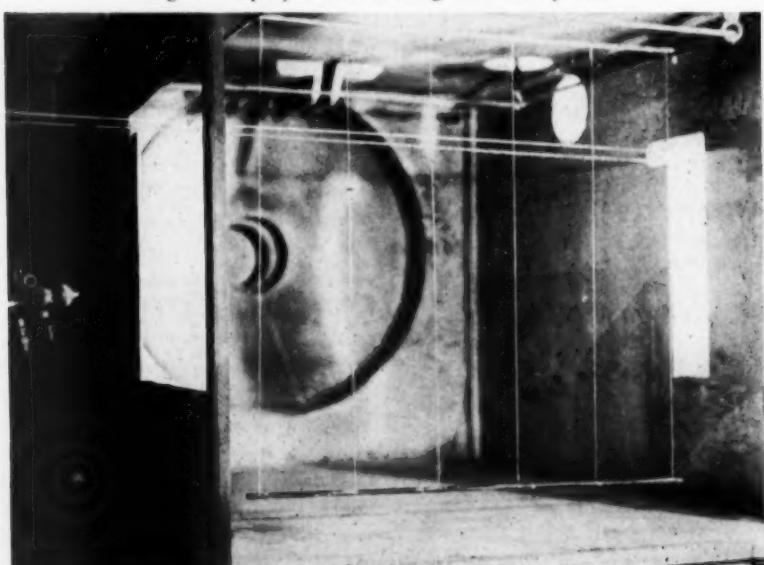
The spray gun used was a standard make of air-operated gun. A variety of tips, needles, and atomizing caps were tried to determine the most satisfactory combination of gun fittings for the process.

The enamel used in the spraying operation was contained in an ordinary two-gallon pressure tank. A gallon bucket containing the enamel was placed in the tank to avoid the necessity of washing the entire pressure tank after each operation.

Air was supplied for the fluid pressure, the atomizing pressure, and for the operating pressure for the automatic gun from the plant-pressure system at approximately 100 lb. per sq. in. The main line pressure was piped through an air transformer at line pressure to the quick shut-off valve for operating the automatic spray gun. The line pressure was reduced through the transformer to the atomizing line and the fluid tank. A second transformer provided a controlled air supply for the throttler controller mechanism, which in turn actuated the diaphragm valve controlling the pressure on the fluid tank. The throttler controller was of a type which would permit accurate control of fluid pressures to within  $\pm 0.2$  lb. (Fig. 3).

To obtain data on the viscosities of the various enamel slips, a modification of the Harrison consistometer was designed which would permit a relatively simple but at the same time accurate measure of the relative

Fig. 2 — Spray booth showing electrode system.



viscosity of the slips in the terms of the number of seconds required for 100 cc. of slip to flow through a capillary at the base of the flow tube (Fig. 4).

### III. Preliminary Investigation

Initial operations with the electrostatic spray were begun without benefit of accurate pressure-control equipment or a power-driven conveyor system. The original conveyer line consisted of a 3/16-in. flexible steel cable, running through the spray booth from front to back, parallel to the depth of the booth and supported at either end by large wooden pulley wheels, and arranged in such a way that ware hung on the cable could be run in or out of the spray booth, past the electrode system by hand. The cable was grounded at one point, providing a ground for the system.

The only pressure-control equipment available was the ordinary type of air-regulating valve commonly found on spray lines and pressure tanks. This type of control, unfortunately, did not provide a sufficient degree of accuracy.

The spray gun was placed in front of the booth in such a way that the axis of spray made an acute angle of approximately 15 degrees with the conveyer line and the surface to be sprayed. Previous investigation on the part of the manufacturers of the spray equipment had proved this angle to provide the most efficient operation. The gun was so placed that the average distance from the gun tip to the plate being sprayed was 28 to 30 in. In so arranging the equipment, the spray was directed approximately toward the exhaust fan in the back of the booth.

#### (\*) Initial experiments

##### with ground coat enamel

In the initial spraying experiments, a ground-coat enamel of the following composition was used: 100 lb. frit, 7 lb. clay, 8 oz. borax, and 4 oz. magnesium carbonate; fineness, 2% on 200-mesh sieve.

A DeVilbiss type WV, air-operated automatic spray gun was tried with various types of tips and atomizing caps to determine which combina-

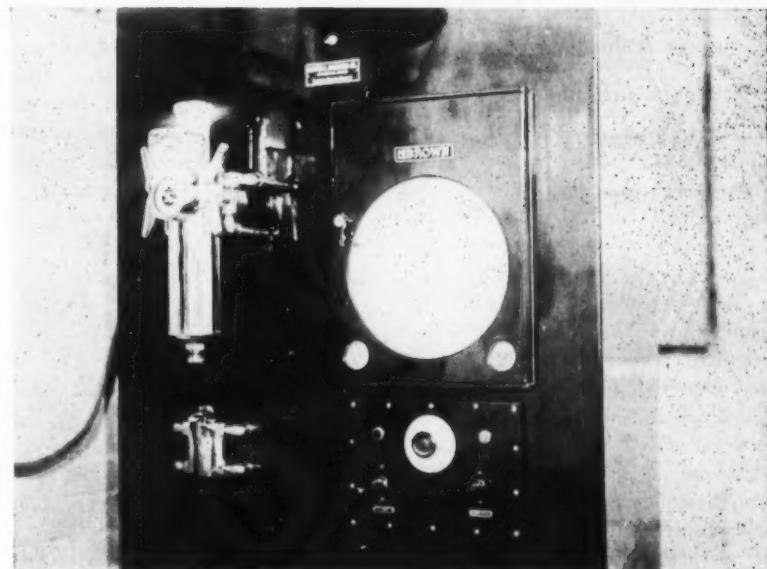


Fig. 3 — Pressure-control panel.

tion gave the maximum degree of atomization. The most satisfactory results were obtained with a No. 765 cap, "G" tip and "G" needle.

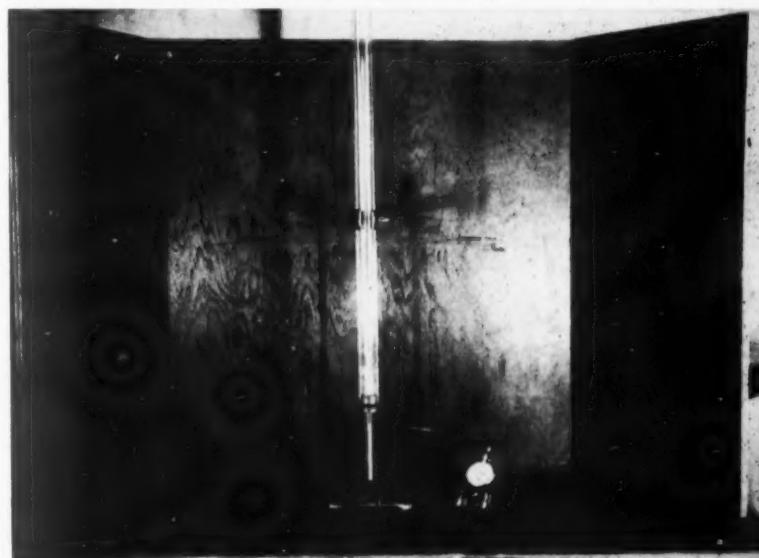
The sprayed plates were rectangular in shape, 10 by 14 in., and were hung with the long axis parallel to the direction of the conveyer.

When spraying at a specific gravity of 1.76, the enamel was too dry by the time it reached the surface of the plate being sprayed and was deposited as a semidry dust. The specific gravity of the slip was reduced to 1.55, resulting in a spray so wet that the

enamel ran off the surface. Variations in the fluid and atomizing pressures were made at both specific gravities with no appreciable improvement in the results.

The same ground-coat enamel was prepared at specific gravities of 1.60, 1.65, and 1.70 and was sprayed with all possible combinations of fluid and atomizing pressures, varying at 5-lb. intervals up to a maximum of 35 lb. The best results were obtained at a specific gravity of 1.70, a fluid pressure of 15 lb., and an atomizing pressure of 20 lb. No effort was made to

Fig. 4 — Modification of Harrison consistometer for measurement of flow time.



measure either the set or viscosity of the slip at this time.

#### (\*) Orange peel minimized

The sprayed plates showed a moderate amount of orange peel which disappeared in firing. Uniformity of deposit from top to bottom depended largely on proper location of the gun. Uniformity from one end of the plate to the other was poor, the end of the plate nearest the gun invariably being light. This was due in part to the fact that the plate was moved into the field and withdrawn but could not be passed entirely through the field and out the other end. To obtain a sufficiently heavy deposit of enamel on the plate, it was necessary to move the plate in and out of the field three times in succession. There was a slight overlapping of the spray for a distance of approximately 1 in. on the side of the plate away from the electrode.

Uniformity from end to end on the plate was considerably improved by hanging other plates ahead of and behind the plate being sprayed.

To determine the effect of the thickness and nature of a coating already applied to a sample on the ability of that sample to pick up additional coatings, one coat of enamel was applied to a sheet and fired and the thickness was measured. The spraying procedure was repeated, all factors remaining the same, and the additional fired thickness was measured. Because the thickness of the second coat was just equal in thickness to the first, it was concluded that a single application of enamel had no effect on the ability of a sample to pick up additional coatings.

To determine the effect of variations in the distance between the electrode system and the object being sprayed, sample plates were sprayed with the electrodes placed at varying distances from the sample. As the distance from the electrode to the plate increased, the force of attraction rapidly decreased; conversely, as the distance from the plate to the electrode was decreased, the force of attraction was increased but with a marked decrease in uniformity.

The output of the power pack orig-

inally was 85,000 volts. This voltage output was increased to approximately 100,000 volts by shorting out a portion of the resistance. Although there was some evidence of increased attraction, the amount was not sufficient with this small increase in voltage to warrant consideration. The power pack remained at this voltage output during the investigation.

For comparisons, sheets were sprayed with lacquer, and the results were checked visually with those obtained with porcelain enamel tests. The lacquer showed no greater tendency to react to the electrostatic field than did the enamel, regardless of the fact that the dielectric strength of the lacquer was considerably lower than that for the enamel.

#### (\*) Investigation continued with cover coat enamel.

Up to this point in the investigation, all work had been conducted with ground-coat enamel. To determine whether or not white cover-coat enamel might be sprayed with equal satisfaction, an enamel of the following composition was made up: 100 lb. frit, 6 lb. clay, 2 lb. opacifier, and 4 oz. magnesium carbonate; fineness, 2% on 200-mesh sieve.

Instead of using the flat sheets, which had been employed previously, broiler doors were obtained, finished in ground coat, 10 by 18 in., with a  $\frac{1}{2}$ -in. flange on one side and a 1-in. flange on the other three sides. The broiler doors were hung vertically on the conveyor line with the long axis parallel to the direction of the conveyer. At a specific gravity of 1.78, the sprayed coating was entirely too dry. The specific gravity of the enamel slip, therefore, was reduced to 1.65 and a few cubic centimeters of a concentrated solution of sodium nitrite was added to provide additional set. The fluid pressure on the tank was adjusted to the point where the enamel would flow uniformly through the gun, and any reduction in pressure would not provide a uniform flow. The atomizing pressure was set at 14 lb. After several adjustments in the location of the gun, it was possible to spray these broiler doors to a satisfactory degree of uniformity.

One of the more interesting features of the spraying process brought out in this phase of the investigation is the fact that in spraying pieces with small flanges, for example, 1 to  $1\frac{1}{2}$  in. wide, the spray has a tendency to overlap the edges of the flanges as well as the surface parallel to the electrode system. In so doing, the radius of the flange, which is normally coated quite heavily by hand or automatic spraying operations, receives a lighter deposit than the remainder of the flange.

#### (\*) Degree of atomization

##### a critical factor.

Throughout the investigation to this point, the degree of atomization of the enamel was one of the more critical factors in the operation. No specific data, moreover, had been obtained on the effect of variations in the specific gravity. An effort was made, therefore, to determine the effect of these two variables on the ability of the enamel to react to the electrostatic field. During this portion of the investigation, it was found that, as the specific gravity increased, the degree of atomization increased, not because of the increase in gravity or because of the decreased water content but because the volume of fluid delivered at constant pressure decreased as the specific gravity and the flow time increased, the atomizing air at constant pressure being capable of atomizing only a limited quantity of fluid. The fluid pressures were also varying as much as one pound either way from a given setting and were causing noticeable variations in the results.

To obtain comparative results, it was necessary to control the volume of fluid delivery per unit of time rather than the fluid pressure; or, more specifically, to control the volume of fluid delivered per unit time at a given pressure, knowing that the pressure was constant. Accurate pressure-control equipment was obtained and installed. At the same time, the conveyor system, described in Section II, replaced the obviously unsatisfactory hand-operated conveyor system.

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#### For a summary of facts

JUNE • 1945 finish

## Porcelain enameled interior and exterior



OPERATORS of restaurants, particularly chain systems, must, under normal conditions, offer something above the "greasy spoon" classification if they are to be successful. In the case of Dorsel's restaurants in Cleveland, Ohio, originality has been carried through from the exterior of their modern buildings to the food served in their "open grill" lunch rooms.

The top photograph shows the attractive exterior of one of the Dorsel's restaurants. Here architectural porcelain, in cream, red and black, has been combined with glass block in an effective design which not only serves to attract attention but produces the impression with potential customers that "here's a restaurant that is modern, neat, clean and inviting."

The lower photo shows the interior of one of the Dorsel's restaurants where porcelain enamel has been used effectively, both to add decorative effect and to serve a very practical purpose of affording a permanent, easy-to-clean surface back of the grill.

Porcelain enamel was chosen for this job because of its high resistance to heat, steam and greases produced by grilled foods.

The panel murals, individually framed in monel metal, are in cool greens, yellows and blue-greens, with multi-colored flowers. The execution of the art in porcelain enamel was by Edward Winters, well-known ceramic artist of Cleveland, Ohio, who is now

in the armed services.

Although architectural porcelain is readily adaptable to a wide variety of uses other than structures of this type, there is no more completely satisfactory material for both the interiors and exteriors of modern restaurants. Enduring beauty and cleanliness, combined with flexibility in design, offer genuine advantages.

# The Washington round-up

By Wilfred Redmond

A PICTURE OF THE CONDITIONS under which the American people will live during the second phase of the war against Japan is presented by Director of Mobilization and Reconversion Fred M. Vinson in a report to the President submitted May 10.

The report is entitled: "The War: Phase Two". It attempts to outline in simple terms, the military and industrial effort which will be required to defeat the Japanese, and the amount and rate of reconversion.

## War production rate to equal 1943

The highlights of the forecast are the following: War production will continue at a very high rate. Even six months from now it will almost equal the rate of 1943. The net decline in war production in the next three months will be from 10 to 15 percent as compared with present levels. From that point, larger cuts cannot take place until the long pipelines to the Pacific have been filled. The needs for the Japanese war will continue so great thereafter as to necessitate the maintenance of production at not far from two-thirds of the schedules of the first half of 1945.

In general it will be the policy to cut back production first in tight labor areas.

## Moderate refrigerator and washing machine production to start "immediately"

Production of certain consumer items such as refrigerators and washing machines will be started immediately in moderate quantities. Many minor electrical appliances and other durable and semi-durable goods will start, or expand production.

While "immediate" production of refrigerators may in some instances mean three or four months, it is expected that there will be a substantial output coming in the second and third quarters following V-E day.

Because of the backlog of demand for refrigerators for highly essential purposes, it is likely that the units produced will go into the stockpile for some time.

Washing machines also will probably be in production in three or four months and be available on the open market. As components become easier, probably in the second and third quarter after VE-day, production will be stepped up.

WPB will restore completely operation of the spot authorization plan for approving civilian production through district and regional offices.

A number of orders which restrict or prohibit the manufacture of certain minor durable and semi-durable goods will be revoked. At the time the report was issued, 53 of these revocations had been announced. More were in prospect. Among orders of significance to manufacturers of finishes which will be revoked in the near future are Copper Order M-9-c and Steel Order M-126 which prohibit the use of copper and steel in certain articles except as permitted under other orders.

The Controlled Materials Plan will be "open-ended" so that steel, copper and aluminum, now channeled entirely by allotments to war production, may be released to civilian manufacturers for purchase in the free market in such quantities as are no longer required for war or essential civilian purposes. (Latest information is that this "open-ending" relaxation will take place July 1).

## Steel releases expected (later report on page 44)

It is expected that two to three million tons of steel will be released during the first quarter after VE-Day,

about 500,000,000 pounds of copper and brass, and around 150,000,000 pounds of aluminum.

Total reconversion of all plants now producing for war is expected to cost not more than \$3,000,000,000.

During the next six months, probably about 1½ millions of workers will lose their jobs.

## Stove production to "step up" soon

Some household needs, such as electric irons and stoves will be stepped up in three to six months. The most essential civilian needs, such as hospitals, are to be filled first. If there are any appliances left over they will probably be sold without rationing.

The Domestic Cooking Appliance and Heating Stove Industry Advisory Committee has recommended the immediate revocation of Order L-23-c, the WPB reported recently. The report recommended elimination of rationing and substitution of industry control of distribution through certification of need for new equipment at the consumer level. The Plumbing and Heating Division reported that a total of 567,409 non-electric cooking stoves and 637,506 non-electric heating stoves were produced in the first quarter of 1945.

Generally, as soon as materials are available for civilian production, furniture again will have metal fittings and hardware as in pre-war models.

A few new cars may be coming off the assembly lines in six to nine months.

## Price ceilings and wage "floors"

OPA will continue price ceilings on items now available and will establish prices on newly manufactured goods. Production of more civilian goods will not, for a while, make price control easier. Both prices and wages will be stabilized as long as the danger of inflation exists. Every attempt will be made to prevent drastic and unwarranted wage cuts. WLB will use its power, if necessary, to set floors under wages, as it has previously set ceilings over them.

## Antimony situation remains critical

Allocations of antimony for the manufacture of porcelain enameled utensils have been, as a rule, denied to the industry for the second quarter. The situation, it is believed, may improve by the third quarter. No new problems have arisen with respect to enamelware, so that as far as can be foreseen through the dust kicked up by the VE-day upheaval, the outlook is good at the present time, according to officials of the Consumer Durable Goods Division. The use of antimony has been permitted for enameled hospital utensils and for cooking utensils, but it will not be permitted for job enameling or for stoves and similar items.

The value of shipments of porcelain enameled products for March amounted to \$3,206,987 as compared with \$2,742,862 for February 1945, \$3,045,834 for March, 1944, and \$2,602,680 for March, 1943, according to statistics released by the Bureau of the Census. The value of product shipments for March was as follows: signs, \$19,137; Drainboards and tub covers, none; Table tops (kitchen cabinets, dinette sets, breakfast sets), none; Refrigerator parts (household and commercial), \$44,878; Stove parts, (sold as such), \$443,977; Reflectors, including fluorescent reflectors, \$365,125; Cooking utensils, including household and hospital, \$2,009,005; and all other, \$319,865.

**At no time since manufacturers started their planning for reconversion and after-the-war production has "news from Washington" been more important to manufacturing executives. Finish brings you the latest reports available prior to press date.**

#### PRESS TIME BULLETIN

OPA has announced the formula that will be used for pricing reconverted products.

To the 1941 costs will be added increases in costs of raw materials and parts and labor costs. To the 1941 costs so adjusted will be added representative peacetime profit margins from 1936 to 1939. These margins, instead of the 1941 profits, will be used because they more nearly approximate pre-war profit operations.

The excess of the resulting figure over 1941 prices will be expressed in terms of an industry-wide "increase factor." This will be a percentage figure by which any manufacturer in the industry may increase his 1941 price or prices.

It was indicated by Price Administrator Chester Bowles that the increase factor for most industries will range up to 12 percent. This industry-wide price increase has been worked out for 36 product groups, which Mr. Bowles said he was not yet ready to identify.

##### Reconversion production classified

There are four types of reconversion production which will have to be dealt with separately in working out a "price increase" factor. They are the following:

1. Products made before the war and which other manufacturers have continued to produce throughout the war.
2. Products made before the war but which have been largely or entirely out of production during the war.
3. New models of pre-war products.
4. Products made by a manufacturer for the first time during the reconversion period.

In the first three cases the manufacturer will be able to determine his ceiling price himself by applying the "increase factor." He will not have to wait for OPA to establish a price for him. In the fourth instance, the manufacturer will apply to OPA for ceiling prices in line with those of his most closely competing product. In all cases the manufacturer may apply for individual adjustments from the industry wide formula where necessary.

It was emphasized that the formula is a basic policy which will permit industry to get started, and that adjustments will be made freely as reconversion experience develops.

OPA will announce later a pricing method which will apply to new models of pre-war products.

Late dispatches from Washington reveal further details of the reconversion program outlined by J. A. Krug, chairman of WPB.

Through the third quarter, 1945, and in some cases for the balance of the year, existing civilian programs already authorized will continue to receive affirmative priorities assistance, including CMP allotments for production materials.

For the balance of the 2nd quarter, the spot authorization program will continue as at present. After July 1, the plan will be used for the authorization of greater production than is allowed under the few remaining orders limiting hard goods output, subject to manpower clearances on larger producers in tight labor areas and a check as to materials availability. Even in these cases, the spot plan will no longer be used as a means of granting affirmative priorities assistance. The Z-1 allotments and preference ratings given to manufacturers under the spot plan will become invalid as of July 1.

Current scheduling procedures will be maintained for components and products in very tight supply where preference ratings alone do not suffice to meet urgent programs on schedule.

##### Preference rating system continues

The preference rating system will continue for the third quarter, 1945. The emergency AAA preference rating and individual directives will also be continued.

Distribution controls governing the flow of end items, including the use of WPB-547 (PD-1X) will generally be retained through the third quarter, but will then for the most part be removed.

Inventory limitations are being retained. They will be amended to permit some pipelining and to cushion the shock of contract terminations and cutbacks.

The construction Order L-41 will be retained but will be gradually relaxed as materials become available in greater quantity. At this time, it is indicated that lumber will not be as desperately short as it was held it would be a few weeks ago. Europe should be able to get its lumber industry in operation among the first and shipments from Sweden should start within 30 days after VE-day although WPB officials have maintained it will take at least 60 days to free the Skagerrak of mine fields. The Navy indicates it will take much less than that.

WPB is contemplating an immediate increase in the permitted ceiling for residential construction from \$8,000 to \$10,000.

##### The metals picture

In an action reported at presstime, WPB revoked Copper end use orders M-9-c, M-9-c-1, M-9-c-2, and M-9-c-4. Control will be retained through allocation of copper under Order M-9. Not much copper will be available before July 1 when mills will be permitted to deliver copper materials on unrated orders through the "open-ending" of CMP.

WPB also plans to revoke Steel end use Order M-126 as soon as Steel Order M-21 is amended to include provisions restricting movement of stainless steel and steels which are now included under M-126.

## Interesting design treatment

in architectural porcelain enamel



ARCHITECTURAL PORCELAIN ENAMEL BY W. A. BARROWS PORCELAIN ENAMEL CO.

This inviting drive-in restaurant is located in Mariemont, Ohio (suburban Cincinnati), and is operated by an experienced restaurant man. As can be seen, it is located in an attractive setting and has a large customer parking lot adjoining.

Mr. Frisch has been successful in the restaurant business, and one logical reason may be seen in the attractive installation reproduced here. The porcelain enameled building is all-steel, insulated construction by Globe Wernicke.

Such installations as this can do much to keep porcelain enamel in the forefront as the outstanding material for restaurant exteriors.

## A. C. S. Section Meeting in St. Louis

A N interesting program was presented to sixty-one ceramists in attendance at a dinner meeting of the St. Louis Section of the American Ceramic Society held at the Forest Park Hotel, on Thursday, May 10.

The program was good, with one of the principal speakers devoting his entire talk to porcelain enamel; the dinner was excellent; and the surroundings inviting — but — enamelters were conspicuous by their absence.

### Clays, enamels and aluminum

The program included "Prospecting for and Testing of Clay Samples from Missouri Clay Deposits," by L. E. Puntney, Laclede-Christy Clay Products Company; "The Use of Porcelain Enamel as a Corrosion Preventative Material," by J. E. Hansen, Ferro Enamel Corporation; and a full color sound film "Unfinished Rainbows," presented by a representative of the Aluminum Company of America.

The program was arranged by H. H. Hanna, Pittsburgh Plate Glass

Company, chairman of the St. Louis Section. Principal business of the meeting was the approval of by-laws for the local section and the election of officers for the succeeding two years.

Charles Pearce, associate secretary of A.C.S. was in attendance, and got a laugh from the group when he referred to the selection of St. Louis as the "worst corrosive atmosphere" for the location of samples in connection with an earlier corrosion research for porcelain enamels. "Then," said Mr. Pearce, "the city put in a smoke abatement program and ruined the test."

### Unfinished rainbows

The film on aluminum may seem like an unusual program selection for a Ceramic Society group. We suggest, however, that every enameler who has the opportunity see and hear this unusual film on the development and uses of aluminum. As competitive material for porcelain enameled metal, aluminum is setting a swift pace in promotional education.

### Hansen on corrosion

In his talk on the use of porcelain enamel for corrosion prevention, Mr. Hansen referred to the new appreciation by the industry of the value of this inherent quality. When porcelain enamel is used as a coating for appliances, sanitary ware and other products where beauty is so important, we forget that porcelain enamel is also valuable to these products because of its protection from corrosion. "Sheet steel, cast iron, etc., corrode easily if not protected. Porcelain enamel outlasts all organic coatings or metallic coatings for corrosion resistance."

### Composition and conditions of use important

The conditions under which porcelain enameled material is to be used should be considered when the material is specified for corrosion protection. In composition there are non-acid resisting enamels, enamels resistant to household acids, and those resistant to acids for industrial use.

More →

*Ed Hansen talks to St. Louis ceramic men. Seated at speaker's table, left to right, are: J. L. Crawford, Welsh Refractories Co., member of the "Rules Committee"; H. H. Hanna, Pittsburgh Plate Glass Co., retiring Section chairman; L. E. Puntney, Laclede-Christy Clay Products Co., who gave a technical paper on Missouri Clay; and H. W. Meyer, General Castings Corp., newly elected Section chairman.*

FINISHPOTO





*The enameler's corner. Left to right: Emil Schwarz, Crunden-Martin Mfg. Co.; George Foehse of National Enameling & Stamping Co.; "Bob" McCann, McDonnell Aircraft (on leave from Nesco); and Ferro Enamel's Joe Thompson.*

Specifications are never on the basis of formulation, but are based on simulated service tests. While composition is important, processing plays an important part and specifications should be on the basis of use.

#### *A.R. recommended for outdoor use*

At least a "semi-A.R." enamel should be used for signs, architectural porcelain and other outdoor uses to resist the metal corrosive conditions of the atmosphere in many localities.

In household appliances it is well to enamel vertical surfaces only with ordinary enamel, and use acid resisting on all horizontal surfaces to resist the acids common in food preparation.

As a result of standardization by the E.U.M.C. and P.E.I., there are solubility tests and acid resisting tests available to serve as a guide in the proper selection of enamels. Labeling of table tops to indicate the degree of acid resistance is a step in the right direction.

Other equipment where acid resistance is needed includes hospital ware (certain types), embalming slabs and bath tubs. (In the latter instance there is the acid used by tile setters to be reckoned with.)

#### *Industrial requirements*

Common uses for highly acid resisting enamels include tanks, vats, and piping for chemicals. Here the importance is its resistance to pro-

gressive acid attack rather than surface attack.

Tests by the Bureau of Standards have shown where porcelain enam-

eled piping for use under ground has withstood ten years' corrosion from acid and alkaline soils, where steel pipe lasted only one and one-half years.

#### *Hot water storage tanks*

Hot water under pressure exerts a very strong solvent action. Special enamels have been developed for a high degree of solubility resistance for hot water storage tanks. Standards have been established through the cooperation of the Bureau of Standards for this class of work.

Mr. Hansen referred to a number of other highly specialized corrosion resistant problems where porcelain enamel has proved effective, either in production or experimentally. "Special enamels used on automobile exhausts experimentally have lasted the life of the car."



**HM-M — PORCELAIN ENAMEL**

# NEWS

## **Bill Trayers to Norge Effingham plant**

William J. Trayers, formerly in charge of the enamel department of the Kalamazoo Stove Co., Kalamazoo, Mich., has joined the Norge division of Borg-Warner Corporation as foreman of the enamel department in the recently acquired Effingham range plant, it was announced by Chas. E. Smith, factory manager. Prior to his association with Kalamazoo Stove, Mr. Trayers was with the Globe American Corp., Kokomo, Indiana.

## **Atlas Enameling joins NESA**

It is reported that the Atlas Enameling Company, 2020 North Broadway, St. Louis, Missouri, recently became a member of the National Electric Sign Association. Mr. C. S. Owen, president, is the official representative.

## **Pearson Porcelain changes name**

Announcement has been made of a change in name for Pearson Porcelain Enameling Company, 5757 Ogden Avenue, Cicero, Illinois. The new name, which is said to be more descriptive of the firm's current activity, including heat treating and steel shot blasting, is the Pearson Industrial Steel Treating Company.

The firm was originally started by J. D. Pearson, who later sold his interest and moved to the West Coast.

JUNE • 1945 finish

Present head of the firm is L. P. Josephs. D. E. Foley, who has been intimately connected with steel and enameling for many years while with Armco and, later, with Chicago Vitreous, is associated with the firm.

## **Godfrey of Frigidaire new General Motors Institute president**



At the annual meeting of the Regents of the General Motors Institute, held in Flint, Michigan, Edward R. Godfrey, general manager of the Frigidaire Division of General Motors was elected president and chairman of the board of Regents.

The General Motors Institute is a Technical Training School where selected General Motors employees spend a definite period as students.

They then return to the G.M.C. plant where they are employed for a similar period of work, and application of the instructions they received during their training. The students alternate these periods over a four year course. During that time they are given an opportunity to study a variety of subjects that include chemical and metallurgical engineering, electrical engineering, industrial engineering and business administration.

## **Two veteran Frigidaire men to key positions**

C. S. Trigg, formerly in charge of Appliance Training at Frigidaire, Dayton, Ohio, is now manager of Appliance Product Promotion and Paul J. Barnaby, formerly of the Commercial Training Department, is manager of the Commercial Product Promotion, according to a recent report.

C. S. Trigg has been employed by Frigidaire for fifteen years and has a diversified background in engineering, service, promotional, and training fields. Paul J. Barnaby brings to his new post seventeen years of Frigidaire experience in the field and with the Factory Sales and Training Divisions.

The Youngstown Sheet and Tube Company has announced the appointment of A. A. Hare as assistant district sales manager of its Pittsburgh district, with offices located at 902 Gulf Building, Pittsburgh 19, Pa.

Mr. Hare, prior to this appointment, covered upper New Jersey for The Youngstown Sheet and Tube Company, with headquarters at 500 Fifth Avenue, New York, N.Y.

## **Midwest receives fourth Army-Navy "E" Award**

Midwest Mfg. Company, Galesburg, Illinois, announces that the War Department has advised them of their fourth Army-Navy "E" Award. Their Army-Navy "E" flag will now have three white stars.

The Galesburg firm, pre-war manufacturers of refrigerator cabinets and kitchen cabinets, has made a wide

variety of war products for the Army, Navy and Air Forces. Their plant is now running at capacity manufacturing several types of flares for Army Ordnance, cartridge storage cases for the same service and droppable fuel tanks for the Army Air Forces.

#### Army-Navy "E" to Automatic Washer

The Automatic Washer Company of Newton, Iowa, was awarded the Army-Navy "E" on May 24, according to W. Neal Gallagher, president and general manager.

This well-known manufacturer of household washers has been a wartime producer of bomb parts, cutter frames for mine sweeps, radar transformer units, sub-assemblies for anti-aircraft guns, steam condensers for water-cooled machine guns, magazine assemblies, cover assemblies for cartridge cases, containers for spare parts kits, machine gun socket wrenches and dummy fuses.

#### New manufacturing head at Conlon

H. B. Paul, for the past five years with the International Detrola Corporation, Detroit, has been placed in charge of manufacturing for the Conlon Corporation, Chicago, according to J. N. Merritt, vice president and general manager.

With International Detrola, Mr. Paul served as works manager of the Libby machine tool manufacturing division in Indianapolis and the radio and electronics plant in Detroit, and, most recently, as general manager of the Libby plant.

#### G-E establishes new air conditioning department

Establishment of the air conditioning department as one of the six major operating departments of the General Electric Company has been announced by C. E. Wilson, president of the company. Operations pertaining to heating, air conditioning and commercial refrigeration had previously been the responsibility of the company's appliance and merchandise department. The new de-

partment will have its headquarters at Bloomfield, N.J., and George R. Prout has been designated as general manager.

Sales divisions of the new department are as follows:

The Industrial, Marine, and Contractor Equipment Division (including refrigerant condensing units and compressors, naval and marine systems, self-contained air conditioners, central plant air conditioners, condi-



George Prout

tioned air cooling units, finned coil surface and heat transfer assemblies, and evaporative condensers and coolers); the Packaged Cooling Equipment Division (including water coolers, room air conditioners, window-mounted room coolers, beverage coolers, commercial food storage cabinets, refrigerated merchandisers and dispensers, and frozen food cabinets in large sizes); and the Automatic Heating Equipment Division, which is responsible for domestic heating equipment.

#### New appliance service organization formed by Philco

Formation of "Philco Service," a world-wide organization of appliance servicemen was announced recently by Robert F. Herr, vice president in charge of service for Philco Corporation. A membership of 25,000 appliance servicemen qualified to repair all types of refrigerators, air conditioners and radio receivers is expected by the organization within the next two years.

Membership in Philco Service is open to individual servicemen, dealers' servicemen, and dealer organizations both in the United States and other countries which have and maintain facilities adequate to carry on high quality work, according to the report. Members will be informed as to the latest technical developments and will be instructed in maintenance and repair work. One of the features of the program will be a Standard Labor Charge schedule to insure the public of fair prices on its repair work and, at the same time, assure the serviceman that he is properly compensated.

#### Philco war production up 31% Net income \$3,938,455

Sales of Philco Corporation in 1944 amounted to \$152,933,250, after voluntary price reductions of \$17,917,736 on Army and Navy work, as compared with \$116,395,598 in 1943, an increase of 31%, according to the Company's annual report signed by John Ballantyne, president, and Larry E. Gubb, chairman of the board of directors, which has been mailed to stockholders.

Net income of Philco Corporation in 1944 amounted to \$3,938,455 or \$2.87 per share, after all taxes, as compared with \$3,573,569 or \$2.60 per share in 1943. Renegotiation conferences have been held for 1944 with the Price Adjustment Board of the Navy Department, and the earnings as reported reflect provision for final renegotiation of the Company's income for the year, the report points out.

#### New Chi. Vit. service man

It is reported that W. D. "Dean" Nicol has been placed in the enamel field service organization at Chicago Vitreous Enamel Product Co., Cicero, Illinois.

Mr. Nicol was formerly in charge of the company's enamel jobbing plant and, during the war, has been in the armor plate division. He has been with the company for five years. Previously he was with Hayes Custer Stove Company, Bloomington, Ill.

## Alfred University to get new ceramics building

The State of New York has set aside \$290,000.00 for a new building for the New York State College of Ceramics. This is a part of the State Building Program instituted to take up the employment slack immediately following the war and the Ceramic College Building is among the first few to start at the war's end.

The plans, which are being made by Haskell, Considine and Haskell, an Elmira architectural firm, are in an advanced stage. The structure and the location of services have been planned and the permanent equipment to go into the building is under discussion.

The older structure known as Binns Hall will be torn down. The new structure will form a complete quadrangle with the building constructed in 1932 forming one side. A one story structure in the court will also be constructed for storage and for a special grinding room with individual dust hoods for each machine.

### Additional space allocated to enamels

In describing the plans for added facilities, C. R. Amberg, Head, Department of Ceramic Research, said: "The additional space and the new construction will make possible a planned allocation of space to each subject taught. In the case of the subject of enamels, it will permit one laboratory to be assigned exclusively to enamel equipment and laboratory work. Additional equipment and testing machines are being planned, which should render this laboratory one of the best equipped enamel laboratories available, among the departments of Ceramics. The space mentioned will not have to include fritting equipment, as it will be set up in the kiln room which will occupy a two story space about 20 x 160 ft. in size.

"In addition to the previously mentioned space, which will be used primarily for teaching, there will be an additional room set aside in the Research Department for work on enamels and glazes and equipped with adequate facilities. The quarters for

the Research Department will be greatly enlarged and will occupy some 6650 square feet of floor space in a continuous block of rooms. Naturally, all the facilities will be available for either teaching or research as occasion demands."

These added facilities for the ex-

pansion of technical training in enamels and ceramics at Alfred, New York, will be welcome news to the enameling industry. The demand for technically trained men is already ahead of the supply, and such expansion programs should do much to alleviate a serious situation in the years ahead.

## Seeger buys Sunbeam

The Seeger Refrigerator Company of Saint Paul, Minnesota, are acquiring the assets of the Sunbeam Electric Manufacturing Company of Evansville, Indiana, according to Walter G. Seeger, president of the St. Paul company. The new company is to be



Walter Seeger

known as the Seeger-Sunbeam Corporation.

The Seeger Refrigerator Company manufactures household cabinets under contract for Sears, Roebuck and Company and Montgomery Ward, and also builds a line of commercial reach-in refrigerators and display cases. During the war period they have manufactured the bomb racks for the B-29 Super-Fortress, 90-mm H.E. shells, flexible ammunition chutes, parachute flares, Oerlikon lockers, ammunition boxes, etc.

The Sunbeam Corporation was founded in 1883, and manufactured railroad head lights. In later years they built electrical refrigerating units and cabinets for Sears, Roebuck and Company's household line of Coldspot refrigerators. Since the

start of the war they also have been operating completely on war contracts.

Both plants will continue their operations without change in personnel except for the retirement of W. A. Carson, of Sunbeam, who will be replaced by Mr. A. J. Lowell of Chicago.

Post-war plans not only include a return to the manufacture of household electric refrigerators and other products made prior to the war, but also a complete line of freezers (low temperature) for the home and Farm. These plans will require considerable expansion and increased employment in both St. Paul and Evansville, according to the Seeger announcement.

News comes to *finish* of the recent marriage of Miss Mildred Konemann to 1st Sgt. Willis V. Levan at Kutztown, Pa. The ceremony was at the Lutheran Trinity Church.

The new Mrs. Levan is the daughter of Clarence J. Konemann. Mr. Konemann is in charge of enameling at Caloric Gas Stove Works, Topton, Pa.

## Robert Clark retires

Those in the industry who have occasion to visit the George M. Clark Division of American Stove Company at Harvey, Illinois, in the future will miss Robert K. Clark, retiring company manager and son of the founder. Mr. Clark's retirement was announced by Arthur Stockstrom, president of American Stove Company, St. Louis, Mo.

According to the announcement, Mr. Clark will continue as a director

of American Stove Company but will spend much of his time at Green Bay, Wisconsin, where he has a large cherry orchard.

Mr. Clark's father, George M., founded George M. Clark and Company in 1881. Robert K. Clark was



"retiring company manager"

graduated from Yale in 1903 and from Massachusetts Institute of Technology in 1905. After a year in the stove factory, and a year on the road for selling experience, he entered the office and later became assistant manager. In 1922 he succeeded the founder as manager. In the parent company affairs he has been a director, vice president and a member of the executive committee.

#### Harold Isaac to manage Clark Division

Harold B. Isaac, who joined the engineering department of George M. Clark and Company Division of American Stove in 1927, succeeds Robert K. Clark as manager. Mr. Isaac was assistant foreman, then foreman of the press room, and from 1940 to the time of his present appointment served as general superintendent.

#### National instrument society organized

A new national society to be known as "The Instrument Society of America" was organized in Pittsburgh on April 28 at a conference attended by delegates from 15 Measurement and Control instrument societies that

have been growing in different industrial centers throughout the country. The purpose of the Society will be to advance the arts and sciences that are connected with the theory, design, manufacture and use of instruments. The society is non-professional, and offers membership to any person, firm or institution interested in the objectives of the Society. Prominent officers were elected as follows: President, A. F. Sperry (Chicago); Vice President, C. F. Kayan (New York); Treasurer, C. E. Fry (Pittsburgh); Secretary, Richard Rimbach (Pittsburgh). Various committees were also appointed to proceed with the organization work, and preparation of constitution and by-laws. The office of the Secretary is the temporary office of the Society and is located at 1117 Wolfendale Street, Pittsburgh 12, Pa.

#### Teague opens West Coast offices



Walter Dorwin Teague, well-known industrial designer, has extended the services of his organization to the Pacific Coast, with new offices located in the Title Guarantee Building, Los Angeles. "The present expansion of the West Coast industry," says Teague, "not only can be made permanent, but can serve in addition as the basis for more intensive industrialization of this area and for all of the countries facing the Pacific Ocean." It is the West's position, he says, of unquestioned leadership in the fields of Light Metals, Aircraft Construction and Air Transportation and in the manufacture of kindred

products that has prompted the move to supplement the operations of the Teague New York organization.

The Teague organization, which numbers among its clients such companies as Goodyear, Ford, Du Pont, Eastman Kodak, and Carrier, has been active in the appliance field for such companies as Bryant Heater, General Electric, Montgomery Ward, Kalamazoo Stove, etc.

#### New board chairman and new president of Florence Stove



Chairman of the board

Mr. R. L. Fowler was elected chairman of the Board, and Mr. Eugene Holland was elected president of Florence Stove Company at the Annual Meetings of Directors and Stockholders.

Mr. Fowler has been president of Florence Stove since 1931. During this time the company has become one of the country's largest producers of stoves and heaters, with total sales increasing from approximately four and one-half million dollars in 1931 to nearly eighteen million dollars in 1941, when the company's facilities were diverted to war work.

Mr. Holland has been vice president in charge of operations of Florence Stove Company since 1940, and, as a result, has a thorough understanding of all Florence operations.

Mr. Wm. T. MacKay, formerly assistant vice president and in charge of the Florence plant at Kankakee,

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# Support the Mighty 7th war loan

## Buy MORE bonds!



TO THE AMERICAN PEOPLE:

Your sons, husbands and brothers who are standing today upon the battlefronts are fighting for more than victory in war. They are fighting for a new world of freedom and peace.

We, upon whom has been placed the responsibility of leading the American forces, appeal to you with all possible earnestness to invest in War Bonds to the fullest extent of your capacity.

Give us not only the needed implements of war, but the assurance and backing of a united people so necessary to hasten the victory and speed the return of your fighting men.

Williams Dealy  
Douglas A. O'King  
Dwight Steamer C.W. Nimitz  
H. Arnold

Space and production costs for this advertisement donated by FINISH in the interest of the seventh war loan drive.

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Illinois, since 1944, was elected a vice president.

Newly elected directors are Treas-



New Florence president

urer A. E. Luke and Vice President G. B. Colburn.

In commenting on the progress of the company during the past year in plans for post-war expansion, Chairman Fowler stressed particularly the company's new southern factory. "The Marshall Stove Company, Lewisburg, Tenn., is now a Florence property. (See *Finish*, January 1945.) We feel that we have been fortunate in acquiring this southern plant. Its addition to our factories in Gardner, Mass., and Kankakee, Ill., gives us a well-rounded setup of modern, strategically-located plants. . . .

"As soon as conditions permit, we plan to revamp this factory. New buildings will be added and the entire plant will be newly-equipped with the most modern machinery for the manufacture of stoves and heaters."

#### Cement bathtubs

(Federal Trade Commission)

Leon Bloch and Myrtle Bloch, co-partners trading as Bloch Brass Co., 1900 Euclid Ave., Cleveland, entered into a stipulation with the Federal Trade Commission to discontinue certain misrepresentations in connection with the sale of cement bathtubs designated "Pearlon Tubs."

The copartners agree to cease and desist from representing that tubs of the Pearlon type are made with Haydite stone or other specified material, without clearly indicating that they are actually of concrete construction; that either the finish or beauty of the tubs is permanent; or that the tubs or other products offered for

sale by the copartners are produced in "our plants," or representing in any manner that they manufacture such articles or own, operate or directly and absolutely control plants for the manufacture thereof in Cleveland, Philadelphia, New Orleans or other cities.

## What can the enamel industry offer the airplane builders?

(From an interview by our Los Angeles correspondent)

It is the opinion of Mr. S. H. Phillips, process engineer for the Douglas Aircraft Company, that enameling has already contributed substantially to aircraft, and stands to contribute a great deal more in the very near future.

"Enameled exhaust stacks have been a life-saver for us since the war broke out," Mr. Phillips claimed. "By using enameled stacks, we have been able to conserve millions of pounds of critical alloys for other vital purposes. Moreover, enameled stacks have served the purpose as well or better than any other material available.

"It is my opinion that jet propulsion will offer new fields for the enameler," Mr. Phillips continued. "The extremely high operating temperatures of jet engines, and the amount of airplane surface that comes in contact with these temperatures makes a heat resistant coating imperative. When airplane manufacturers return to commercial production, and when cost becomes a primary factor, I can think of no available material that can compete with enameled iron for such a purpose."

Mr. Phillips' opinion is not to be taken lightly. If he says enameled iron will be used in aircraft, chances

are he is very right. Mr. Phillips began his aviation career as a British subject in 1910. His activities lead him to the British Air Ministry be-



process engineer Phillips

fore he decided to come to America. In America, Mr. Phillips has been associated with both the Naval Aircraft Factory and the Goodyear Zeppelin Corporation before his present affiliation with Douglas Aircraft. He helped to build the ill-fated Shenandoah. Currently, under Mr. Phillips' supervision, process men are studying the application of ceramics to various aircraft parts.

## Sign industry elated over cancellation of "brownout"

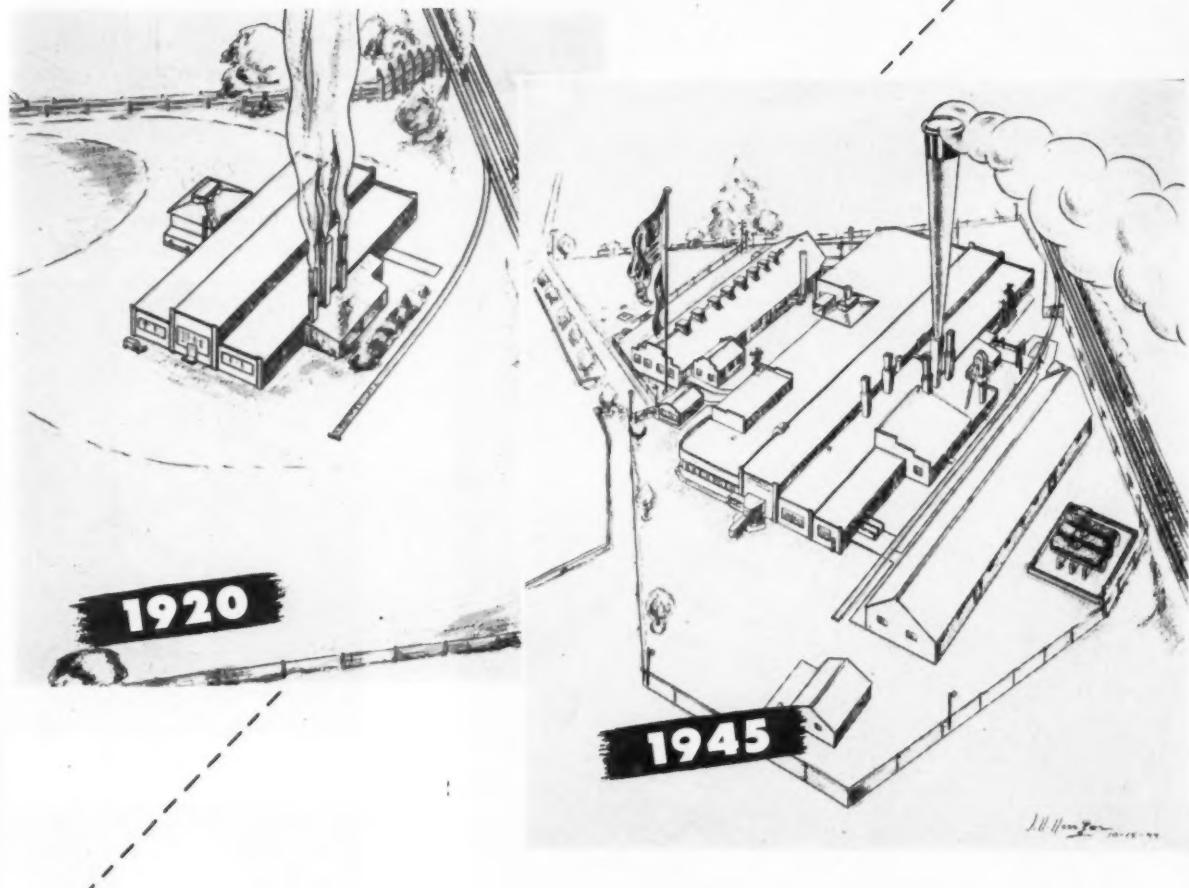
Users of illuminated signs are again in position to derive the benefit of this important method of advertising and identification through the cancellation of the "brownout" order. One thing that will be agreed on by manufacturers and users alike is that a new realization of the importance

of quality signs has registered with sign users as a result of the ban.

Many durable porcelain enameled signs that have been neglected for long periods of time were given a face cleaning job to get full benefit from the lustrous surfaces when no

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# 25 YEARS STEADY GROWTH



Little by little Vitreous Steel Products Co. has grown to take care of an increasing number of customers and many new products. No sudden spurt—just steady additions to plant and equipment.

Vitreous has never been the biggest enameler in the world. We are sure that we have one of the most modern,

completely equipped jobbing plants in the industry.

Ask any of our customers who have been buying from us from the day we opened; or better yet, give us a chance to do some of your work.

If you are interested, we shall be very glad to see you at Nappanee and show you through the plant.

**VITREOUS STEEL PRODUCTS CO.**  
BOX 1791, CLEVELAND 5, OHIO (Factory at Nappanee, Ind.)

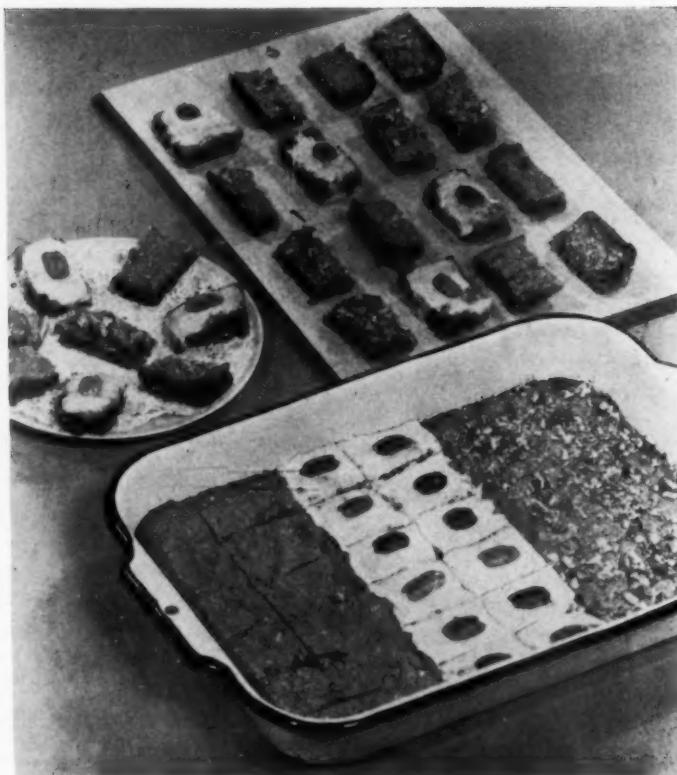
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lighting was available. This clean-up work will, of course, give added benefit now that the lights are on again.

The wartime ban on the manufacture of signs has also given the sign owner a better appreciation of the

permanence of porcelain enamel, and those who were satisfied with less durable materials pre-war may now logically insist on porcelain enamel for their identification and advertising signs purchased for future use.

### E.U.M.C. continues publicity work



The Enamored Utensil Manufacturers Council continues its publicity activity, through the Lawrence H. Selz Organization, with regular releases to publications reaching the buying public. Selling, for the most part, is indirect through the use of recipes and cooking and baking suggestions.

The caption for the accompanying

photo reads as follows:

"One batch of cookies treated in three different ways gives variety to cookie platters without the fuss of making three separate batches of cookies. *Using a porcelain enameled baking pan into which the whole batch of dough is poured is a time-saver.*"

### PEI considering architectural division

At a recent meeting of the Executive Committee of the Porcelain Enamel Institute held in Chicago there was discussion concerning the formation of an architectural sub-division of the Active membership classification. It is the opinion of some of

the P.E.I. leaders that due to the rapid growth of this branch of the industry prior to the war, and the expected rapid expansion following the release of war restrictions, problems of this division of the industry should be quickly solved.

It is expected that a plan for setting up this sub-division will be pre-

sented for action at the next meeting of the Board of Trustees.

Present indications are that the P.E.I. annual meeting will be a "meeting by mail" with the exception of the required Board meeting.

### A-B Stoves, Inc., now a division of Detroit-Michigan Stove Company

At a special meeting of the stockholders of A-B Stoves, Inc. of Battle Creek, Michigan, a plan of reorganization as submitted to the company by the Detroit-Michigan Stove Company was accepted and adopted.



John A. Fry



Wendell L. Smith

Henceforth A-B Stoves, Inc., will operate as A-B Stoves Division of the Detroit-Michigan Stove Company. Mr. Wendell L. Smith, president of A-B, was elected to the Board and also an executive vice president of *to Page 40 →*

*Here*

WE  
GUARANTEE  
**O. HOMMEL CO.**  
MATERIALS

## THE BEST CERAMIC SUPPLIES ARE IMPORTANT IN PRODUCTION

..... but they can never be a magic cure-all for ceramic production troubles. There is no harm in wishing, but there is little hope of finding an Aladdin's lamp to make such wishes come true. Remember this whenever you buy frit, chemicals and ceramic colors ..... put all the superlatives, the sales talk and the magic claims on one side of the scale, and weigh them against this simple statement .....

"We guarantee O. Hommel Co. materials to perform faithfully in your plant and to do everything you, as a practical ceramist, can expect good materials to do." This is a guarantee that has never been changed since the first Hommel Bronze Powder was made, many long years ago.

**O. HOMMEL CO.**  
209 FOURTH AVENUE  
PITTSBURGH 30, PENNA.



*- World's Most Complete Ceramic Supplier -*

# WHEN NOTHIN'S COOKIN'

## REPLACE

WITH

# TK



### TK REPLACEMENT UNITS ARE AVAILABLE NOW TO FIT ANY ELECTRIC RANGE

When your customer—Mrs. Housewife—calls and says, "Supper's on the stove but nothin's cookin'"—it's time for you to replace the burned out unit with a TK replacement unit assuring long life, economy and trouble proof operation. Every TK replacement means a loyal friend for your firm.



### A Bit of Timely Advice to Electric Range Dealers

**TUTTLE & KIFT INC.**

1825 NORTH MONITOR AVENUE

CHICAGO 39, ILLINOIS

**RANGE MANUFACTURERS:** This advertising, appearing in leading electrical publications, is guiding T-K replacement units into new homes daily. Each new user is a potential buyer for a new electric range with T-K units. Capitalize on this dealer and consumer acceptance by using only T-K units for your post-war ranges.

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the Detroit-Michigan Stove Company.

Mr. Smith will continue as the executive officer of the A-B Stoves Division and will retain the present personnel, according to a report to finish.

This reorganization brings together two well-known companies in the gas and electric appliance field. Mr. John A. Fry, president of the Detroit-Michigan Stove Company, announces that this is the first step taken in carrying out a comprehensive program for the post war period to better serve the customers of both companies.

### Despatch Ovens opens new field engineering office

It is reported that the Despatch Oven Company of Minneapolis, Minn., has opened a new sales and field engineering office in Suite 1334, La Salle Wacker Bldg., 221 N. La Salle St., Chicago 1, Illinois, with John H. Watson as general manager of the office.

It is further reported that the men on the engineering staff of the Chicago office have had experience in oven and furnace design ranging from eight to twenty-three years.

### Westinghouse changes corporate name

It is reported that effective May 12, 1945, the name Westinghouse Electric Corporation replaced the former full name "Westinghouse Electric and Manufacturing Company."

The name change was recommended some time ago by the Board of Directors for the sake of simplicity and brevity. The report states that in order to conserve paper, the new name will not appear on most of the company forms until existing stationery supplies are exhausted.

### Stuart of Westinghouse Lighting Division new vice president

Ralph C. Stuart, in charge of the Lamp and Lighting Divisions of Westinghouse Electric Corporation,

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*Prepare*  
for this  
**INCREASED  
DEMAND**



U.S. Steel Bathroom. In this colorful, modern bathroom, wall and ceiling panels, shelves, washbasin and bathtub are porcelain enamel, fused on a base of U.S.-S VITRENAMEL Sheets.

THE people who will build, repair or buy millions of war homes will demand bath, kitchens, laundries, of colorful, easily cleaned porcelain-fused steel.

In retail stores, when it is possible, many merchants will new customer-appeal into store counters, cabinets and shelving full value from the added durability and color of porcelain-enamelled steel.

In factories, office buildings, restaurants, laboratories and hospitals, from lavatories to operating rooms, the war-proven versatility of high-grade porcelain-enamel makes its almost universal use a certainty.

New frits have been developed to give a greater range of both solid color and

### THIS ADVERTISING BUILDS

*Postwar Business*

FOR YOU!

ONE AIM . . . VICTORY . . . BUY BONDS!  
**U·S·S VITRENAMEL SHEETS**  
CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago  
Columbia Steel Company, San Francisco, Pacific Coast Distributors  
United States Steel Export Company, New York



**UNITED STATES STEEL**

WE are regularly publishing advertisements like this in the leading architectural magazines. This advertisement has one purpose only:

To convince America's architects . . . the men who will control postwar building design and material specifications . . . of the advantages of using porcelain enamel building products.

This means, we believe, an expanded market for porcelain enamel products after the war. And it means, therefore, better postwar business for you.

Many enamelist, seeking the best base for a fine finish, have found it in U·S·S VITRENAMEL Sheets. Flat, strong, ductile, they speed up the work. The specially processed surface enables the frit—under firing—to form a firm bond with the metal base.

As your plans for the future take on more definite shape, be sure to get current and complete information on U·S·S VITRENAMEL Sheets. Our technical specialists will be glad to consult with you on the use of VITRENAMEL Sheets.

**U·S·S VITRENAMEL SHEETS**  
CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, Pacific Coast Distributors  
United States Steel Export Company, New York

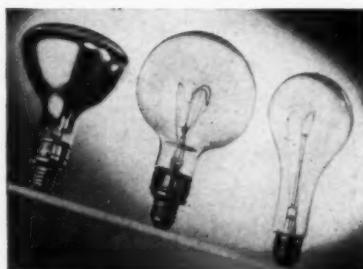


**UNITED STATES STEEL**

## INDUSTRIAL SUPPLIES AND EQUIPMENT

### New Sylvania infrared lamps

Seven new infrared lamps, including four clear drying and three reflector drying types, with wattages ranging from 125 to 500, have been announced by Sylvania Electric Products, Inc., for many industrial heating services including metal preheating, baking, drying and dehydrating.



The clear drying types provide a constant heat center length, which permits a change in oven temperature simply by substituting lamps of suitable wattage. Reflector changes are unnecessary.

The reflector drying types offer a flexible infrared heating source for many drying and processing applications, including those in enameling plants, paint shops, foundries, and other industries.

### New Wheelabrator Swing Tables



The American Foundry Equipment Company, 555 South Bykit Street, Mishawaka, Indiana, report the addition of several new models in their line of Wheelabrator Swing Tables which they say extends the use of airless blast cleaning to a wide range of intricate or irregular shaped work formerly cleaned in air blast rooms in jobbing foundries and other metal working plants.

Work to be cleaned is placed on a rubber-covered work table which is mounted on the door of the blast cabinet. As the door is closed the work table swings into the cabinet under a Wheelabrator airless blast unit.

### New G-E twin turret fluorescent lampholder

A newly designed fluorescent lamp holder known as the "Twin Turret," which holds the lamp securely in contact, has been announced by the ac-

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Exclusive methods of preparation, patented equipment for separation and purification and petrographic and chemical controls assure you a trouble-free product.

Orefraction's new milling system produces a milled Zircon of exceedingly pure chemical analysis.

Now available for Ceramic Colorants  
**OREFRACTION RUTILE (HIGH TiO<sub>2</sub> Content)**

*Prompt Deliveries Anywhere!*

Trade Mark  
U.S. Pat. Office

**Orefraction, Inc.**

7505 MEADE STREET • PITTSBURGH 8, PENNA.  
Telephone Churchill 3200 • Jack Hunt, Mgr.

## EXPERIENCED MEN AND MODERN EQUIPMENT PRODUCE CENTURY TIME-PROVED FRITS



Years of experience and the combined knowledge of the production and application problems of porcelain enamel are back of "Century" time-proved frits. "Century" is large enough to serve you promptly and efficiently, yet small enough that manufacturing processes get the personal attention of its experienced head.

Modern equipment, up-to-date methods, and plant men with long experience work together to maintain the uniform quality of "Century" frits. It is this uniformity of

product and uniformity of results which have done much to build the loyalty that you will find among "Century" users. "Century" customers stay with us once they start.

Plant men like "Century" enamels for their day-by-day dependable results — executives like them for their resulting low per-square-foot cost.

If you have an enameling problem, why not call on "Century" — a company that both produces and applies enamel?

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*Century Vitreous Enamel Company*

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6641-6661 SOUTH NARRAGANSETT AVENUE • CHICAGO • ILLINOIS

JUNE • 1945 finish

**NEWS → from Page 40**

has been elected vice president of the company.

Mr. Stuart will administer the four

plants of the Lamp Division and the Lighting Division's Cleveland, Ohio, plant from headquarters at Bloomfield, New Jersey.

**Roper establishes veterans policy**



At left aviation cadet Joseph P. Larson, Roper employee now in the armed forces, listens while Roper president Stanley H. Hobson explains Roper's policy of jobs for veterans when they return.

Geo. D. Roper Corporation, Rockford, Illinois, has put into effect a policy regarding re-employment of service men. The policy, as explained in the Roper News Letter, which is sent each month to the Roper men and women in the Armed Forces, embraces four main features:

1. A job for every employee returning from the Armed Forces.
2. Proper placement in work of the returning veteran.
3. Assistance in finding more suitable work or in planning an

educational program.

4. Direct counsel and help to the handicapped veteran in finding a satisfactory place in civilian life.

The company reports that the program has been in operation for some time under the direction of Willard Otto, personnel department. It is further indicated that Roper employees who have been doing an excellent war production job will be needed later for peacetime production.

**LATEST REPORT FROM WASHINGTON**

By Wilfred Redmond

Cutbacks on steel will not occur as rapidly as projected and will be considerably less in the third quarter for production of less essential items than earlier estimates indicated. However, it is expected there will be enough steel avail-

able for production of substantial numbers of washing machines, typewriters, vacuum cleaners and smaller items in the durable goods category.

There will not be enough material available in the third quar-

ter for anything like mass production of refrigerators, stoves, or metal furniture, J. A. Krug, chairman of WPB, said at a recent press conference.

Such items as refrigerators, stoves, washing machines and containers will probably be programmed through the third quarter, which means that they will be controlled through allocation of materials. WPB expects to take all essential goods off programming by the end of the third quarter and all military programming by the end of the fourth quarter.

As soon as possible, WPB will release all control over less essential and non-essential civilian goods, and hopes to get out of the essential item category, probably by the fourth quarter.

The lead picture is extremely serious and recent efforts to improve it by recruiting workers for the mines have not been successful.

In a study of industries judged to be most seriously in need of preliminary reconversion help of a kind designed to prevent bottlenecks in return to peacetime production, WPB estimated that the vitreous china and semi-vitreous or porcelain plumbing fixtures industry would need a break-even peacetime production per quarter amounting to \$8,750,000.

**Antimony controls tightened**

WPB has moved to tighten control over antimony by requiring purchasers under Conservation Order M-112 to certify as to their need for a particular type of antimony.

Purpose of the amendment is to get all users of the metal to substitute antimony ore for the metal or oxide wherever possible. WPB officials emphasized that this restriction would not make more oxide available for ceramic applications, but merely reflects heavier demands by the military for flame-retarding paints and other products.

# TELESCOPING TIME



Time must be telescoped when you're doing a war job and planning for the future too. Every minute must yield more results. And Du Pont Technical Service is ready to help save you vital time. Come to us for information on new developments. We'll work with you in selecting processes and materials best suited to your future production needs.

When supplies permit, you'll find Du Pont's complete line of ceramic colors meets your every requirement. They're standardized for hue, strength and stability. For samples, write E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington 98, Delaware.



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

SPEED THE PEACE—WITH WAR BONDS!

**DU PONT CERAMIC COLORS**

# Will porcelain enamel get its share of the air marker business?

the answer to this question is up to the enameling industry

INDIVIDUALS and organizations in the enameling industry have been eyeing the market for air markers for some time, and some work has been done in meeting the design requirements of the C.A.A. for standardized markers. *Finish* has been in touch with both local and national authorities on this subject, and it is apparent that if the enameling industry is to get its share of the business in this field it calls for quick work on the part of the enamelters and suppliers.

It will not be sufficient that we make plans for the "future" for the work is being done currently, and if porcelain enamel is not in on the early market enamlers will have to be satisfied with the replacement market.

Here are some examples of what is happening at present:

In April, North Carolina had fifty towns and cities either marked or the money raised for proper air markers.

One southern state has an equivalent number of towns marked, and all markers are PAINTED.

Kansas now has thirty counties in which markers are being installed out of 105 counties to be marked.

West Virginia has announced a state-wide program.

Pennsylvania has announced a two-year program.

Illinois has launched a state-wide program under which sites are currently being selected and plans drawn for proper marking for the entire state.

#### Article in *finish* attracts attention

Following the printing of the article "Weatherproof Aero Signs Offer a New Market for Porcelain Enamel," in the May issue of *finish*, we

received the following interesting letter among the comments pertaining to this article:

Civil Air Patrol  
Headquarters  
Squadron 611-2

Dear Mr. Chase:

Referring to our telephone conversation regarding the article in the May issue of "*finish*," page 24, I have discussed this with the Commander and Intelligence Officer of our Squadron and am privileged to give you this information.

Under Illinois Wing Bulletin No. 104, the Air Marking Activity of the Illinois Wing, Civil Air Patrol, has been standardized with a view to a concerted effort on the part of Squadrons in the State towards selection of, design of, carrying out the actual marking of, and final publicity concerning Air Markers throughout the State of Illinois.

Because of the large proportion of this work, and the coverage that is expected to be obtained, it would seem to me that the steel manufacturers and the enameling industry might be particularly interested in working with the Illinois Wing of the Civil Air Patrol with a view to setting up at least one or more Test Marking Units, with a view to determining costs and overcoming difficulties which usually present themselves with the development of a new idea.

The Civil Aeronautic Administration, in its Bulletin No. 12, has very clearly enunciated proposals for Air Marking. These proposals are based on a number of years of study and in this study they definitely recommend the use of enamel signs as one of the Air Marking methods.

If the Illinois Wing Committee can

render any service in promotion of adequate and economical Air Markings through the good auspices of your magazine, or the industries you touch, we will appreciate hearing from you.

Signed: 2nd Lt. G. M. Glidden  
Chairman, Air Marking Committee  
DuPage Squadron  
611-2, C.A.P.

#### An opportunity to "get going"

In his letter, Lt. Glidden offers a constructive suggestion that should appeal to steel producers and enamlers alike. This suggestion, however, calls for immediate action by any one who wants to take the initiative in this instance, where the "door is open."

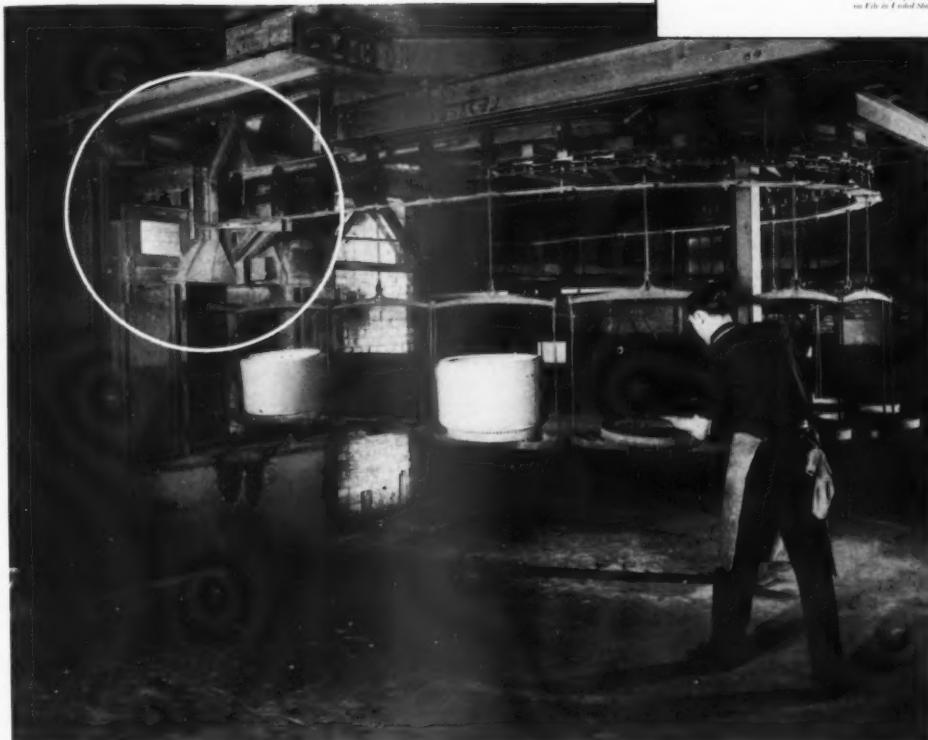
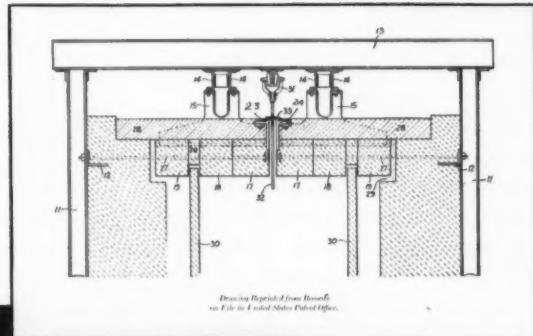
#### *Finish* will help

If any steel companies, material producers or enameling plants are interested, individually or as a group, in cooperating with Squadron 611-2 in the immediate development of test marking units, we suggest that you contact *finish* immediately or send your communications direct to Lt. G. M. Glidden, c/o E. D. Bullard Company, 133 N. Sacramento Blvd., Chicago 12, Illinois. A meeting can then be arranged with the proper authorities and plans laid for producing test marking units.

If this job is done, and done well, it can readily pave the way for national publicity on porcelain enamelled markers and do much to acquaint innumerable other authorities responsible for local marking with the most legible, durable and generally practical material for permanent air markers.

# **ONLY BOLAND**

## **"Single Flow" Furnaces have "Floating Roof" Construction**



**THIS REPRODUCTION OF A PATENT DRAWING SHOWS THE PRINCIPLE OF THE "FLOATING ROOF."**

**TYPICAL FURNACE INSTALLATION AT INGERSOLL STEEL & DOME DIV., BORG WARNER CORP.**

**LOOK** to the roof when studying the design of your next continuous furnace. Only Boland furnaces have **FLOATING ROOF** construction. (Boland Patent No. 2,156,008.)

This roof, "built like Gibraltar," not only minimizes heat loss, but offers permanent insurance against conveyor distortion. The accompanying sketch shows the design characteristics of the roof which "carries its own weight."

This feature alone may be important enough to you to specify Boland furnaces, but in addition you get the added features of equalized temperature, heavier furnace loads and the elimination of time and labor consuming "furnace conveyor wrecks" in the Boland STRAIGHT AWAY — SINGLE FLOW continuous furnace.

**WHY NOT TOSS ASIDE  
YOUR FURNACE WOR-  
RIES AND CALL IN A  
BOLAND ENGINEER?**



# **ALBERT J. BOLAND COMPANY**

**407 NORTH EIGHTH BUILDING • ST. LOUIS 1, MO.**

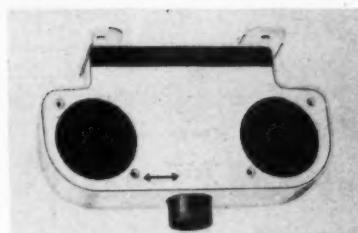
DESIGNERS AND BUILDERS OF CONTINUOUS AND BOX TYPE ENAMELING FURNACES

JUNE • 1945 finish

→ from Page 42

cessory equipment division of General Electric's appliance and merchandise department, Bridgeport, Conn.

The new lampholder is made for use with 40-watt lamps. It has a husky metal casing with insulated face and holds two Mazda F fluorescent lamps. Starter sockets are an integral part of the lampholder and are located between the lamps. They



will accommodate either FS-40 Watch Dog starters or conventional FS-4 starters.

## Industrial Publications

### New tangent bender bulletin

A new 16-page bulletin, pictorially describing in detail many of the suggested products that can be produced on the improved Tangent Benders, has just been released by Struthers Wells Corporation, Titusville, Pa.

The bulletin provides comprehensive data on the Single Wing, Double Wing and the newly developed Stretch Wing Tangent Bender Machines, with engineering information, special features, product shapes and designs that can be formed in a single operation.

Planned for design engineers and those associated with metal products, the booklet illustrates a great many metal products, including radiator covers, cabinets, tables, complete kitchens and bathrooms, freezer cabinets, washing machines, laundry trays, radiant heaters, fluorescent lighting fixtures and other metal products.

Plant men and engineers, write for Bulletin No. 58-TF.

### P.E.I. publishes revised edition of the reflectance test

Standard tests are the order of the day, whether they are tests for wearability, washing machines, or reflectance tests for the paint, paper or porcelain enameling industry.

A new "Reflectance Test" (For Opaque White Porcelain Enamels) has just been announced by the Porcelain Enamel Institute. It is based on a standard approved by the Product Standards Section of the P.E.I.

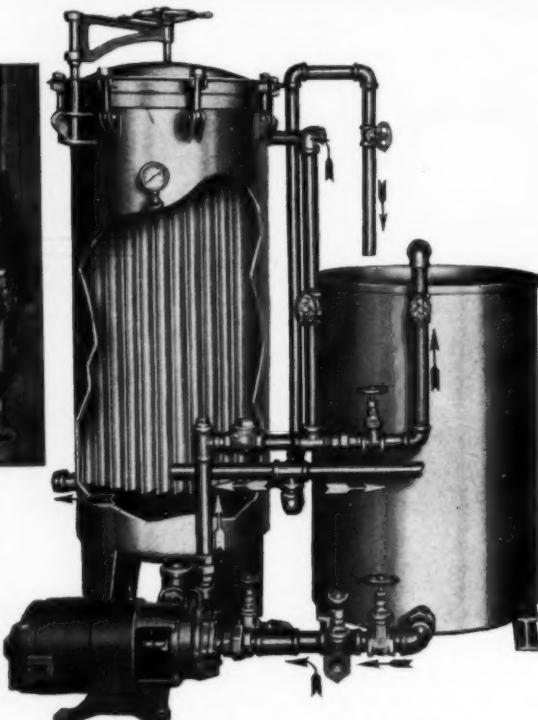
The Foreword to the booklet starts with this message: "The porcelain enamel industry has recognized, as have other progressive industries, that the continued influx of technology and science is indispensable for any industry to reach and maintain a position of leadership. As the industry grew the need for yardsticks to measure the degree of advancement, and for means to maintain the highest levels of quality, became evident. The Product Standards Section assumed the task of developing the required standards in their simplest and most

to Page 52 →

## KEEP PICKLE ROOM SOLUTIONS "ALIVE" LONGER WITH INDUSTRIAL PRESSURE FILTERS



Above: This installation in a large enameled plant pickle room recirculates and filters 2,000 gal. of nickel tank solution per hour, operating approximately 8 hours out of 24.



A stationary type Industrial Plate Filter available in sizes with from 95 to 290 sq. ft. of filter area.

**Industrial Filters offer you a modern and dependable clarification and purifying system to keep your pickle room producing at top speed.**

**Made in a wide range of sizes and capacities, both portable and stationary, they offer the convenient and labor saving method of filtering nickel or neutralizer solutions.**

**Save time, save money, and keep your new pickle room at top efficiency. Include Industrial pressure Filters in your plans for a modern plant. Send for specifications on a unit to meet your requirements.**

Automatic Filter powder feeders, special alloy pumps, Filter cloth and Filter aids

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# Orefraction

INCORPORATED

7505 MEADE ST.



PITTSBURGH, PA.

March 12, 1945

Mr. Dana Chase  
Dana Chase Publications  
360 North Michigan Avenue  
Chicago 1, Illinois

Dear Mr. Chase:

Yes, we do wish to continue Orefraction advertising in Finish. New copy and schedule will come to you from our advertising agency, Smith, Taylor & Jenkins, Inc., Pittsburgh.

Finish magazine is, in my opinion, beautifully designed and printed. The subject matter is particularly well chosen for a balanced and interesting diet. From cover to cover it gives pleasure to handle and look at because of the nice layout and many pictures. All of the editorial material seems well written and easy to read.

I should say you are doing a splendid job for the industry. You refer to your plan as only gathering momentum. I shall watch with a great deal of interest the unfolding of new ideas and improvements.

Yours sincerely,

*Frank Wilhelms*  
Frank Wilhelms

FW:DH

Thank you Orefraction . . . It is the loyalty of finish advertisers which is making it possible for us to give the porcelain enameling industry its first independent trade publication and to increase the editorial services with each succeeding issue . . . It is the loyalty of finish readers which makes it profitable for advertisers to support the publication.

THE ENAMELING INDUSTRY'S ONLY INDEPENDENT TRADE PUBLICATION -

f  
**finish**

## Flash welding in metal fabrication

(Continued from Page 16)

sequent machining will turn it into a gear or cam integral with the shaft; it may be split and used for the production of odd-shaped bolt heads; a bulge formed on either side of a plate or casting will act as an integral rivet; small pistons, integral stops, and axle hubs are among numerous other possibilities.

The size and shape of the forged bulge is readily controlled by the spacing between the clamping dies. An upset may be accomplished on the end of a rod by using a solid current-carrying block to replace the die in the stationary platen and butting the plastic metal against the block by means of the movable platen. Adjacent upsets, one against the other, may be accomplished in sequence,

thus providing an overall greater upset area.

### To the enameler

It would be needless to itemize the numerous uses of the flash welder either for welding or for upset forging. Any person acquainted with metal fabrication will note immediately the possibilities inherent with these processes. From the standpoint of the enameler interested in product quality and economy, the flash welder offers not only an efficient method for fabrication prior to enamel application, but will deliver a product to the enameling shop well suited to utilize to the best advantage an enameled coating.

apparently has no effect on the ability of that object to pick up additional coatings.

(14) The most satisfactory specific gravity lies in the neighborhood of 1.70 gm. per cc.

(15) Ground-coat and cover-coat enamels may be sprayed with an equal degree of satisfaction.

(16) It is essential that fluid and atomizing pressures be controlled more accurately than can be done by ordinary means.

(17) The capacity of any single unit is, as yet, an unknown factor; on installations of industrial size, that is, for spraying table tops, stove parts, etc., it will probably be necessary to use more than a single power pack; a slight increase in amperage is also necessary to overcome the additional resistance provided by a larger electrode system.

On the basis of these conclusions, a program of research was laid out to determine the effect of variations in the physical properties of enamel slips on the ability of these slips to atomize, to react to the electrostatic field, and to produce a satisfactory sprayed finish.

## Electrostatic spraying of porcelain enamels

### PART I

(Continued from Page 24)

#### (\*) A summary of facts.

The preliminary investigation and investigations previously conducted by the manufacturers of the equipment revealed the following facts:

(1) In spraying, the charge on the grounded object is always positive and the charge on the electrode is always negative; the charge in the field, therefore, is always negative and the charge placed on particles entering the field will be negative.

(2) There is no means of actually measuring the force of the field; the length of the spark gap is an approximate measure of this force.

(3) Increases in voltage within the limits of any single installation do not appreciably affect the force of the electrostatic field.

(4) The dielectric strength of a given material has no effect on the ability of that material to react to the force of the field.

(5) Additions of electrolytes have no effect on the reactability of the enamel slip.

(6) In spraying irregular sheets, it is essential that the electrode system conform in contour to the contour

of the object being coated.

(7) A spacing of from 6 to 8 in. between electrode wires and 10 to 12 in. between the electrode and the object has been found most efficient.

(8) The axis of the spray must make an acute angle of 15 degrees with the surface to be coated for most efficient results.

(9) The uniformity of the coating is dependent largely on the location of the spray gun.

(10) The smallest fluid tip available and an atomizing cap with a maximum number of air holes provides a maximum degree and uniformity of atomization.

(11) The effect of particle size on ability to react to the field lies in the force of inertia in particles of increased size and density. The greater the inertia of the particle passing through the field, the less effective the force of the field; no minimum effective particle size has been determined.

(12) A maximum degree and uniformity of atomization is essential.

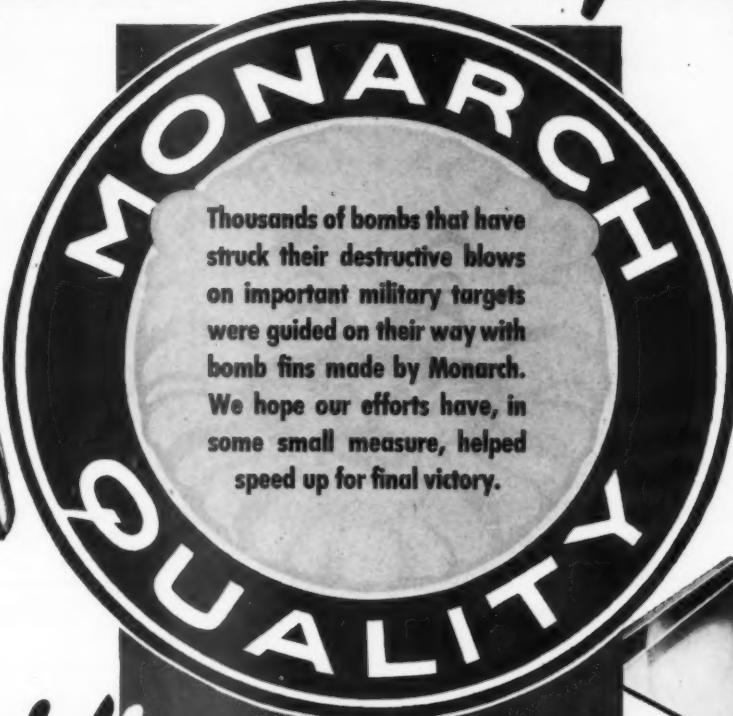
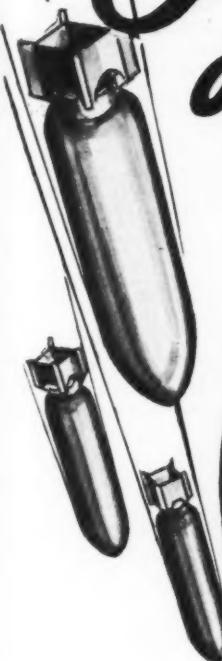
(13) A coating of enamel already applied to an object being coated

Read Part II of this article in July *finish*. It starts with the method of procedure used in this investigation and covers studies of atomization, location of spray gun, control of fluid volume, effect of clay content, effect of specific gravity and water content, and other important factors pertaining to the electrostatic spraying process.

*For those who do not maintain a permanent file of finish, we suggest that Part I be clipped and retained for filing with the remainder of the article so that complete data will be available.*

*Cooking utensils of enameled ware have been made for over eighty years. At first the base metal was made from iron and only the inside was coated, but in 1859, the Bartelmes family in Bohemia began making utensils from sheet iron.*

# Guiding Bombs is part of our defense program



## Guiding

YOUR PRECISION-MADE  
STAMPINGS THROUGH  
ONE OF OUR 3 MODERN  
PRODUCTION PLANTS WILL  
BE OUR AFTER-THE-WAR  
PROGRAM



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